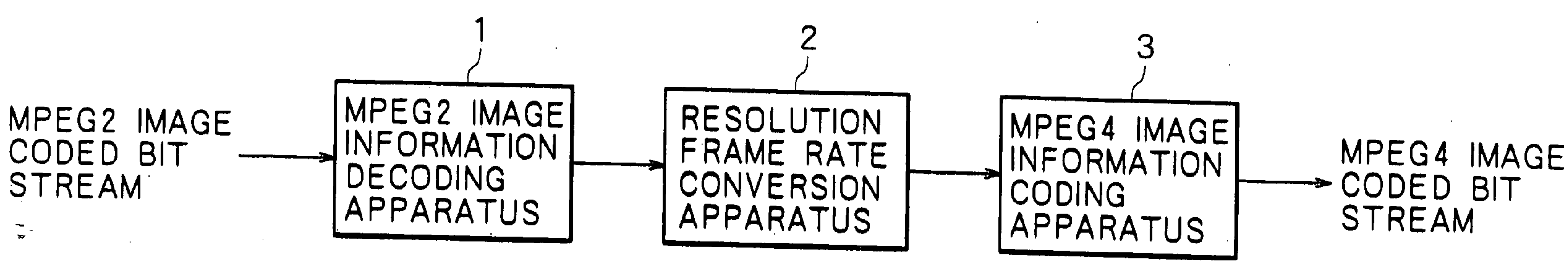
F I G. 1



MPEG2 IMAGE CODED BIT STREAM
1
MPEG2 IMAGE INFORMATION DECODING APPARATUS
2
RESOLUTION FRAME RATE CONVERSION APPARATUS
3
MPEG4 IMAGE INFORMATION CODING APPARATUS
MPEG4 IMAGE CODED BIT STREAM

FIG. 2

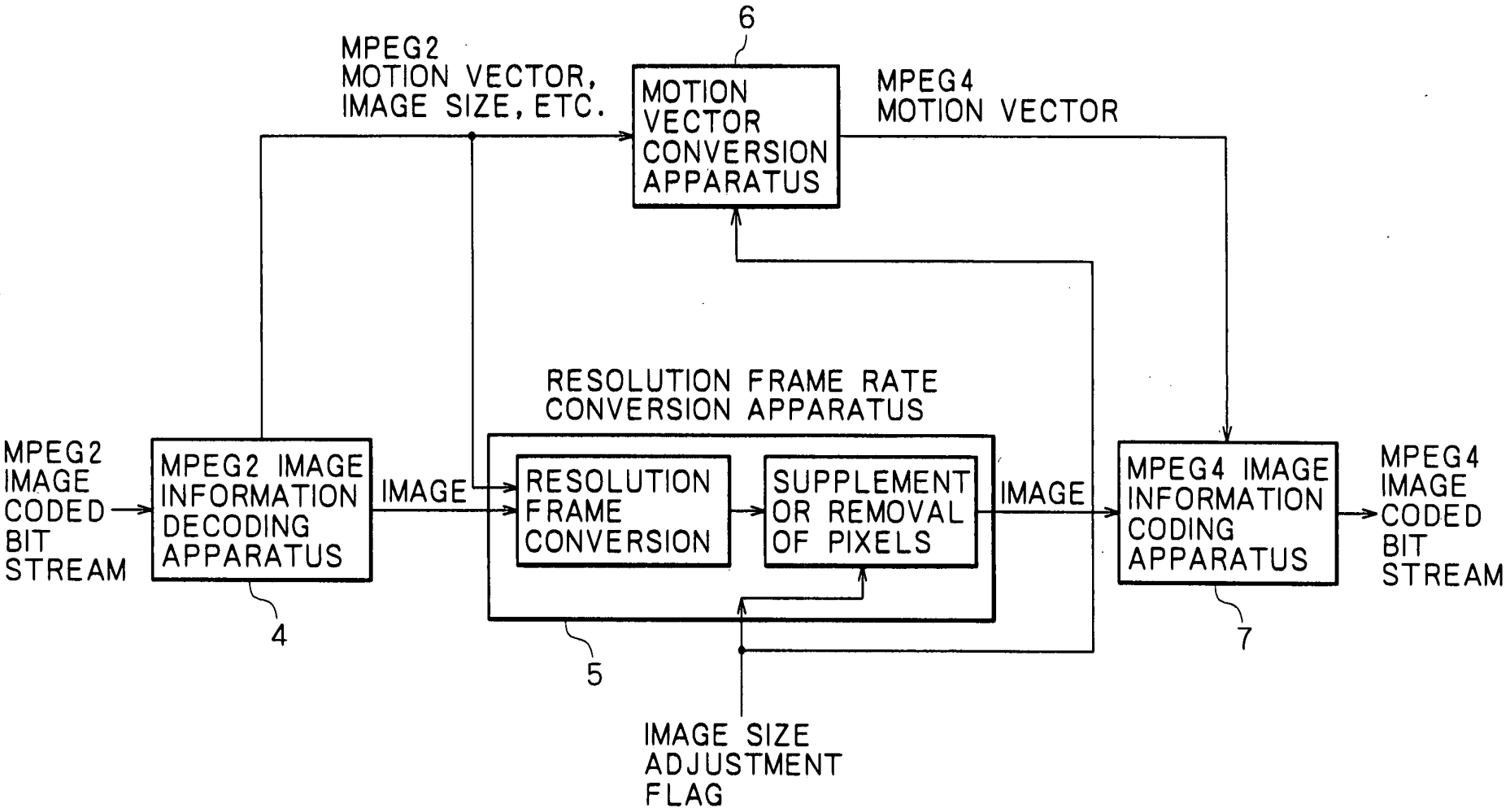


FIG. 3A

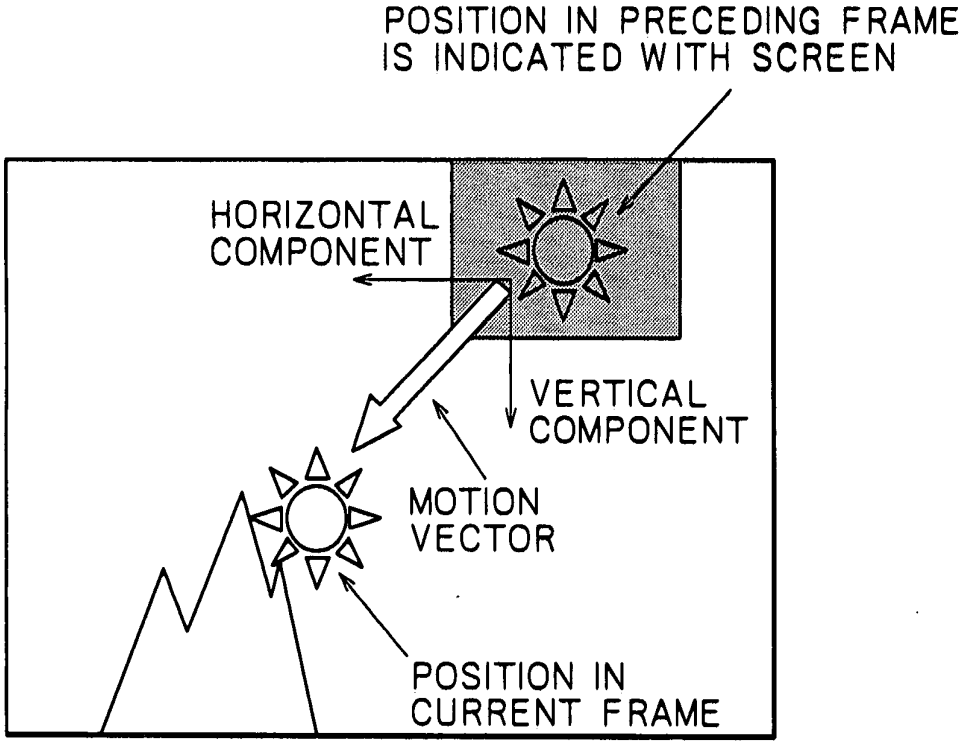


FIG. 3B

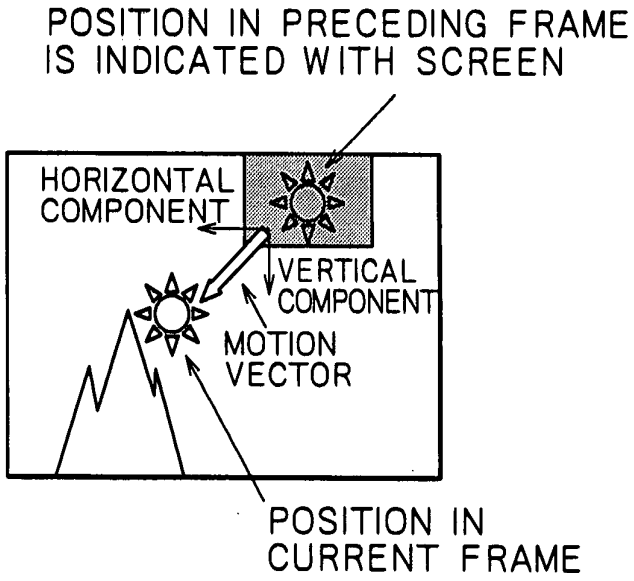


FIG. 4

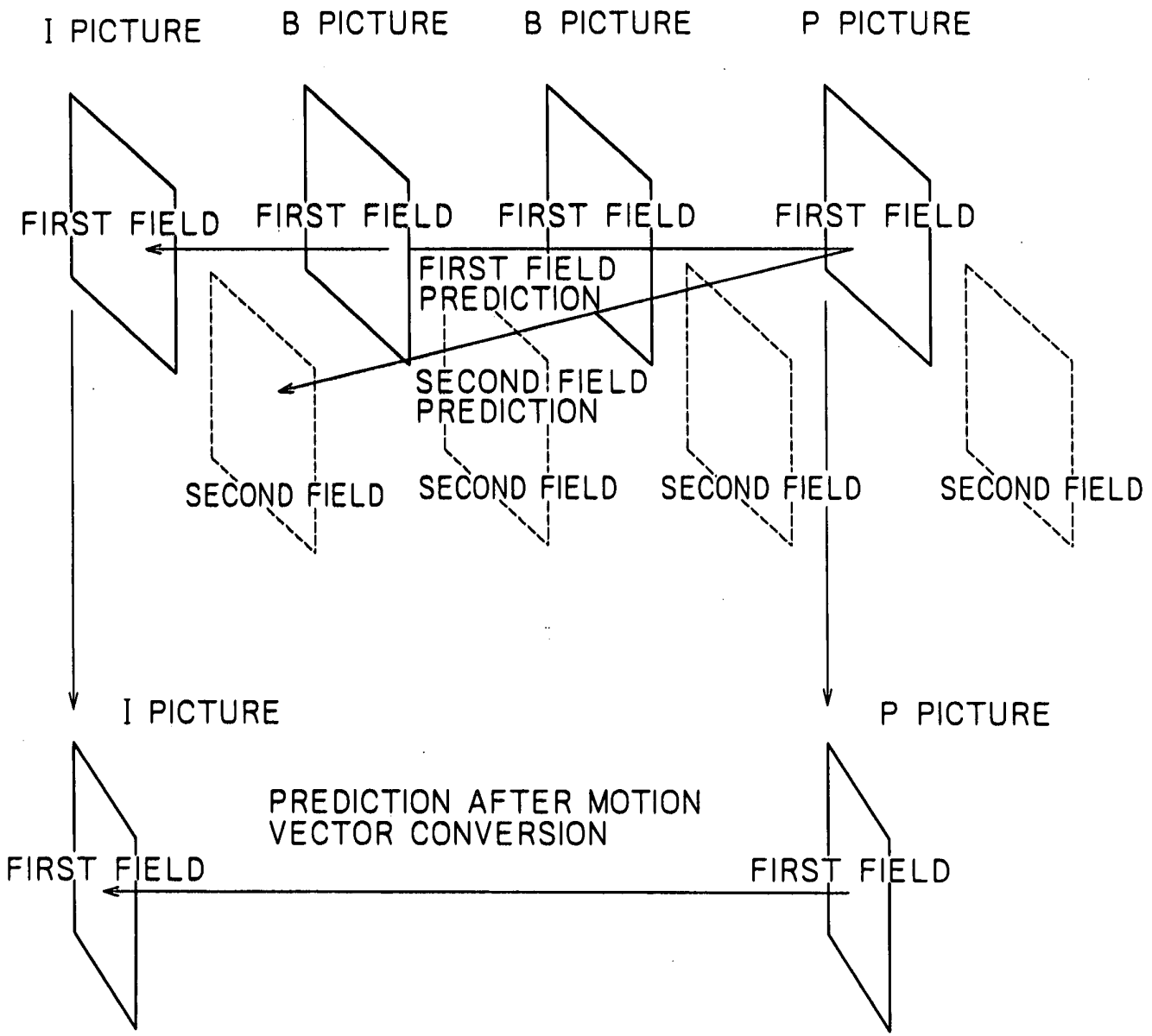


FIG. 5

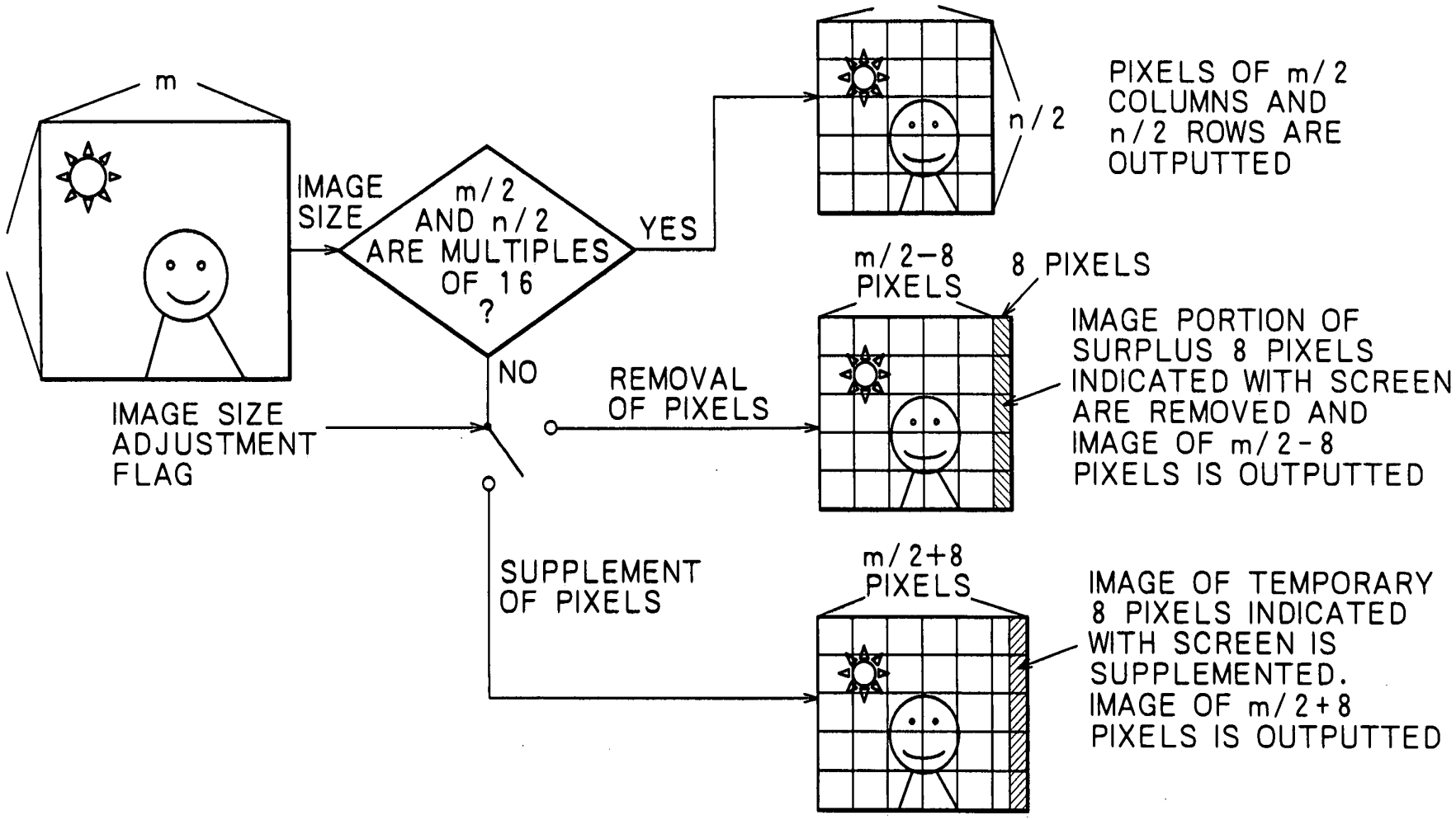
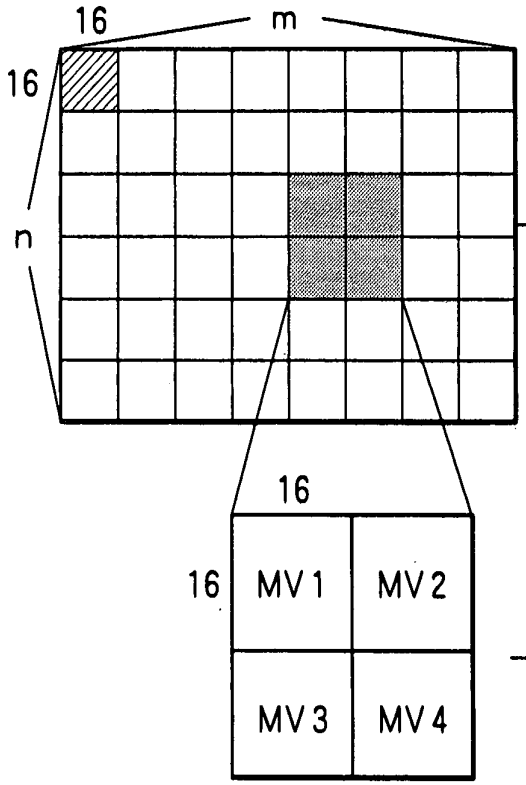

m
IMAGE SIZE
m/2 AND n/2 ARE MULTIPLES OF 16 ?
YES
NO
IMAGE SIZE ADJUSTMENT FLAG
REMOVAL OF PIXELS
SUPPLEMENT OF PIXELS
n/2
PIXELS OF m/2 COLUMNS AND n/2 ROWS ARE OUTPUTTED
m/2-8 PIXELS
8 PIXELS
IMAGE PORTION OF SURPLUS 8 PIXELS INDICATED WITH SCREEN ARE REMOVED AND IMAGE OF m/2-8 PIXELS IS OUTPUTTED
m/2+8 PIXELS
IMAGE OF TEMPORARY 8 PIXELS INDICATED WITH SCREEN IS SUPPLEMENTED. IMAGE OF m/2+8 PIXELS IS OUTPUTTED

FIG. 6A

IMAGE DECODED BY MPEG2 DECODING SYSTEM



BEFORE RESOLUTION CONVERSION

FIG. 6B

IMAGE CODED BY MPEG4 CODING SYSTEM

AFTER RESOLUTION CONVERSION

FIG. 7

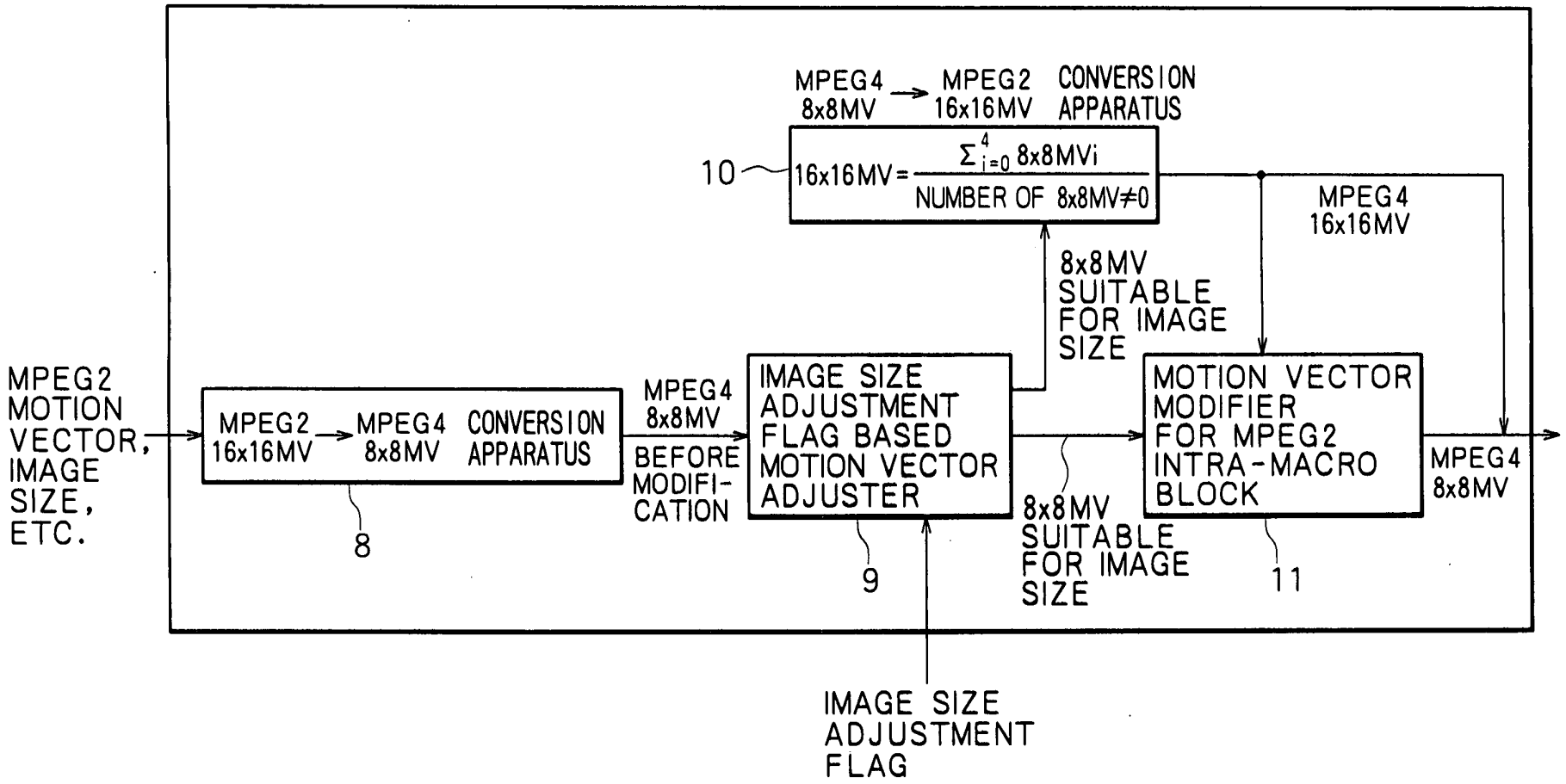

MPEG4 8x8MV → MPEG2 16x16MV CONVERSION APPARATUS
10
16x16MV = Σ_{i=0}^{4} 8x8MVi / NUMBER OF 8x8MV≠0
MPEG4 16x16MV
8x8MV SUITABLE FOR IMAGE SIZE
MPEG2 MOTION VECTOR, IMAGE SIZE, ETC.
MPEG2 16x16MV → MPEG4 8x8MV CONVERSION APPARATUS
8
MPEG4 8x8MV BEFORE MODIFI-CATION
IMAGE SIZE ADJUSTMENT FLAG BASED MOTION VECTOR ADJUSTER
9
8x8MV SUITABLE FOR IMAGE SIZE
MOTION VECTOR MODIFIER FOR MPEG2 INTRA-MACRO BLOCK
11
MPEG4 8x8MV
IMAGE SIZE ADJUSTMENT FLAG

FIG.8

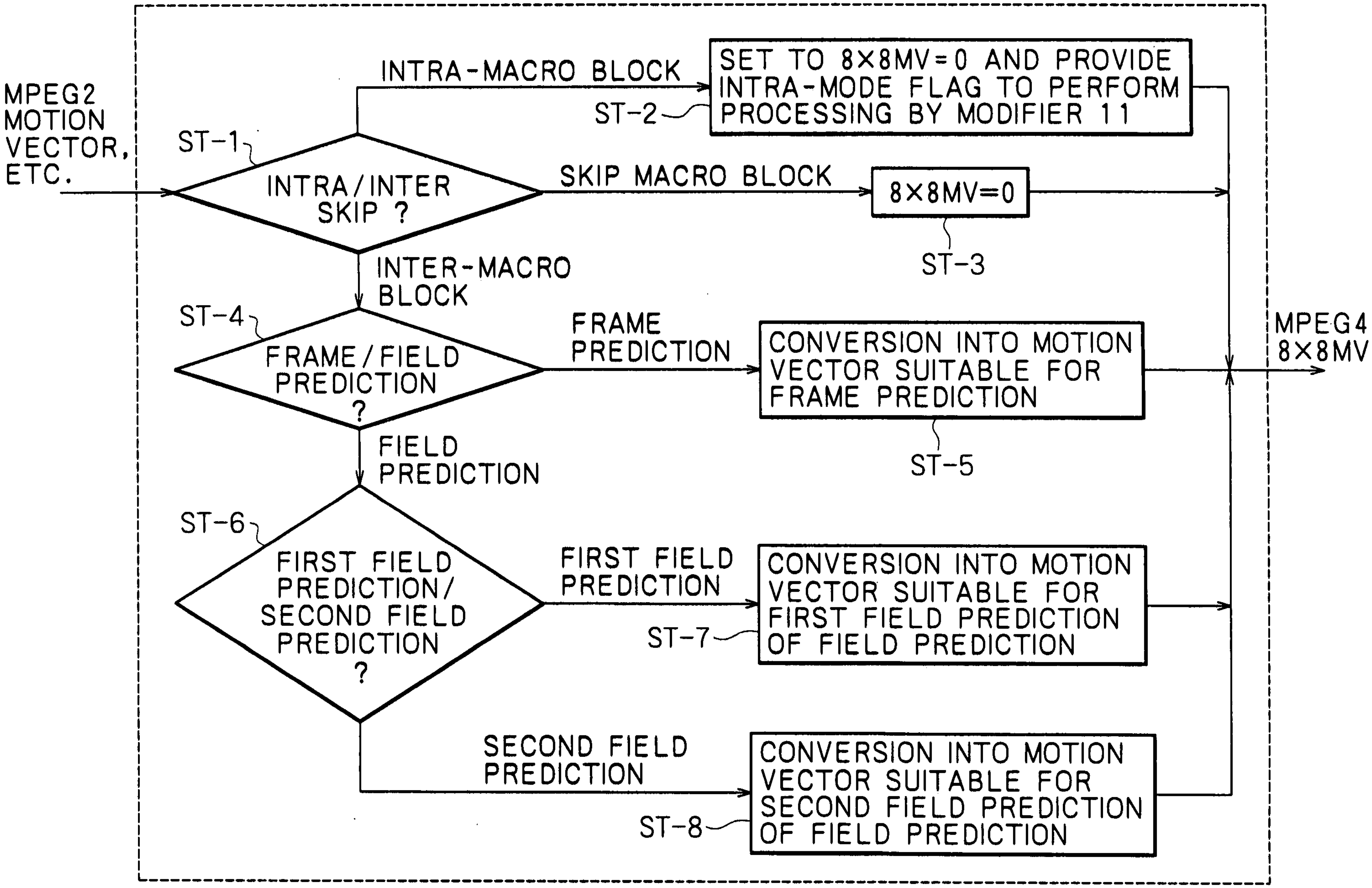

MPEG2
MOTION
VECTOR,
ETC.
ST-1
INTRA/INTER
SKIP ?
INTRA-MACRO BLOCK
SET TO 8×8MV=0 AND PROVIDE
INTRA-MODE FLAG TO PERFORM
PROCESSING BY MODIFIER 11
ST-2
SKIP MACRO BLOCK
8×8MV=0
ST-3
INTER-MACRO
BLOCK
ST-4
FRAME/FIELD
PREDICTION
?
FRAME
PREDICTION
CONVERSION INTO MOTION
VECTOR SUITABLE FOR
FRAME PREDICTION
ST-5
FIELD
PREDICTION
ST-6
FIRST FIELD
PREDICTION/
SECOND FIELD
PREDICTION
?
FIRST FIELD
PREDICTION
CONVERSION INTO MOTION
VECTOR SUITABLE FOR
FIRST FIELD PREDICTION
OF FIELD PREDICTION
ST-7
SECOND FIELD
PREDICTION
CONVERSION INTO MOTION
VECTOR SUITABLE FOR
SECOND FIELD PREDICTION
OF FIELD PREDICTION
ST-8
MPEG4
8×8MV

FIG. 9A

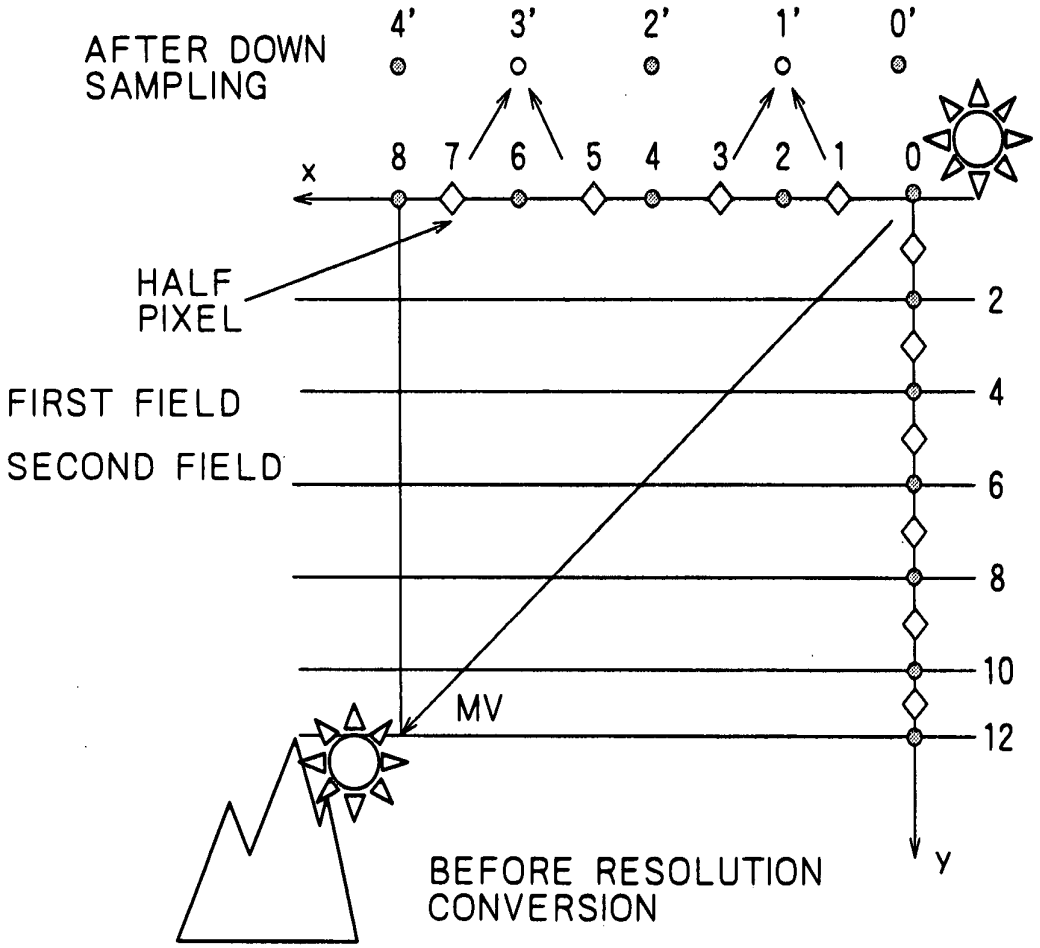


FIG. 9B

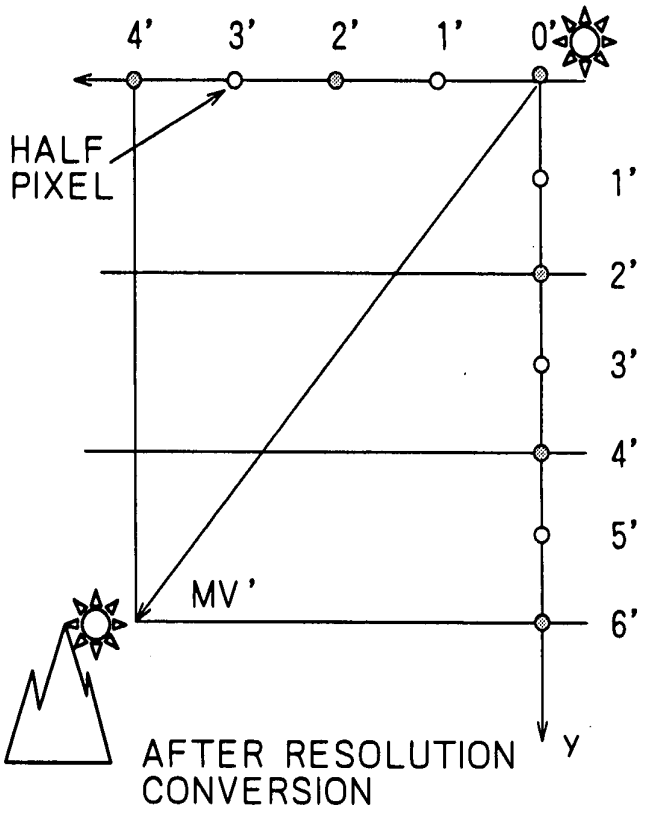


FIG. 10

REMAINDER WHEN MOTION VECTOR MV BEFORE CONVERSION IS DIVIDED BY 4	0	1	2	3
MOTION VECTOR AFTER CONVERSION	[MV/2]	[MV/2]+1	[MV/2]	[MV/2]

[MV/2] REPRESENTS INTEGER PART WHEN MV IS DIVIDED BY 2

FIG. 11A

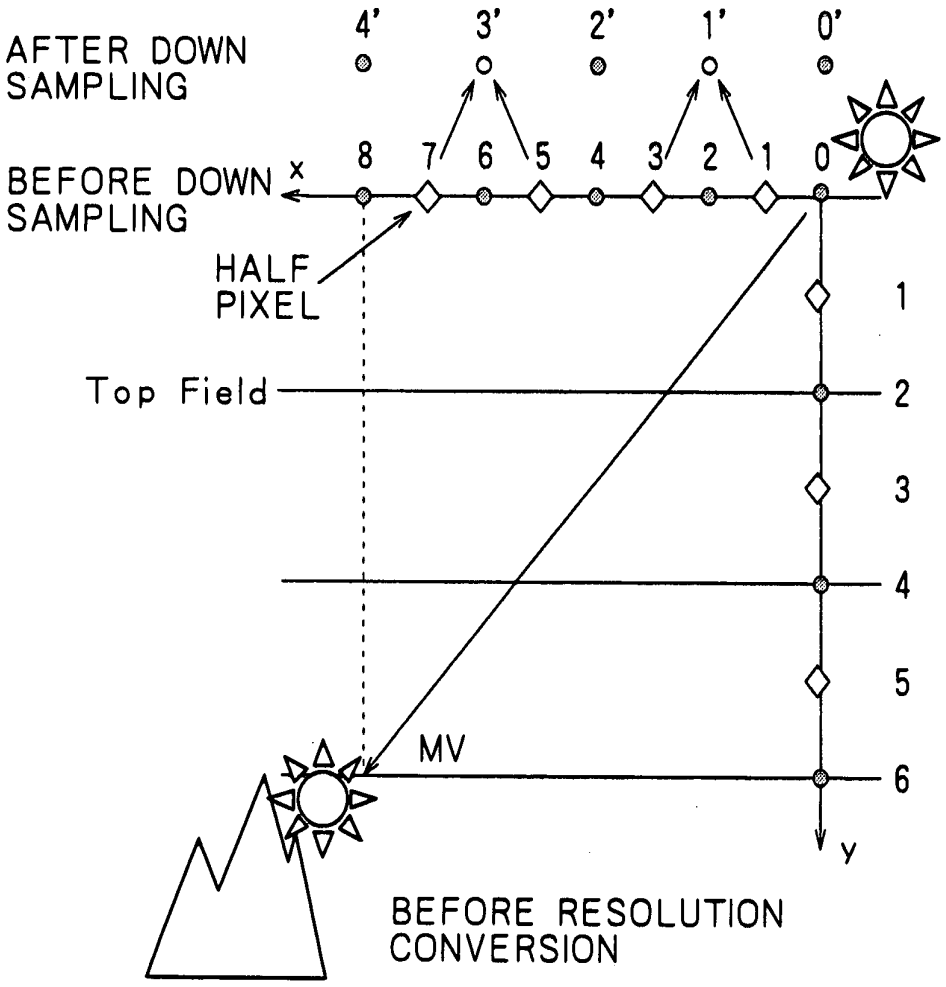
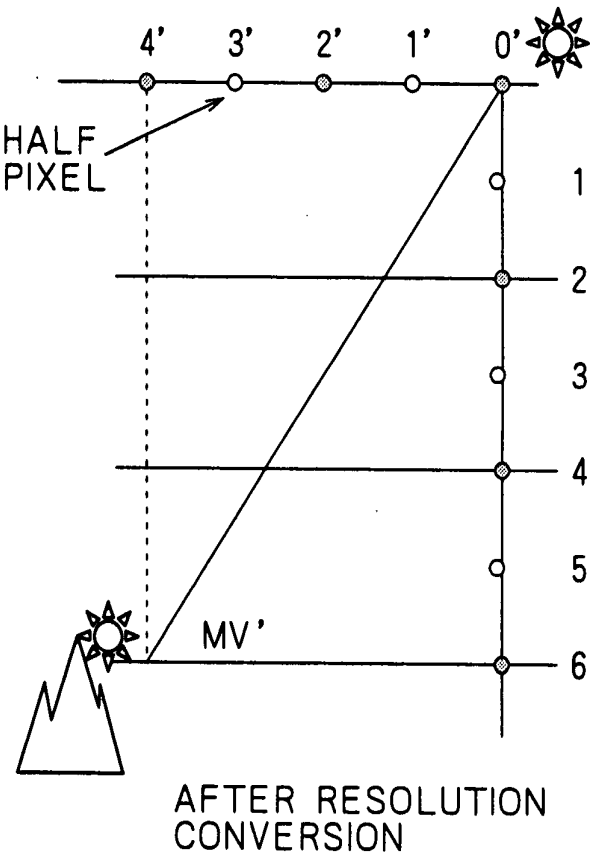
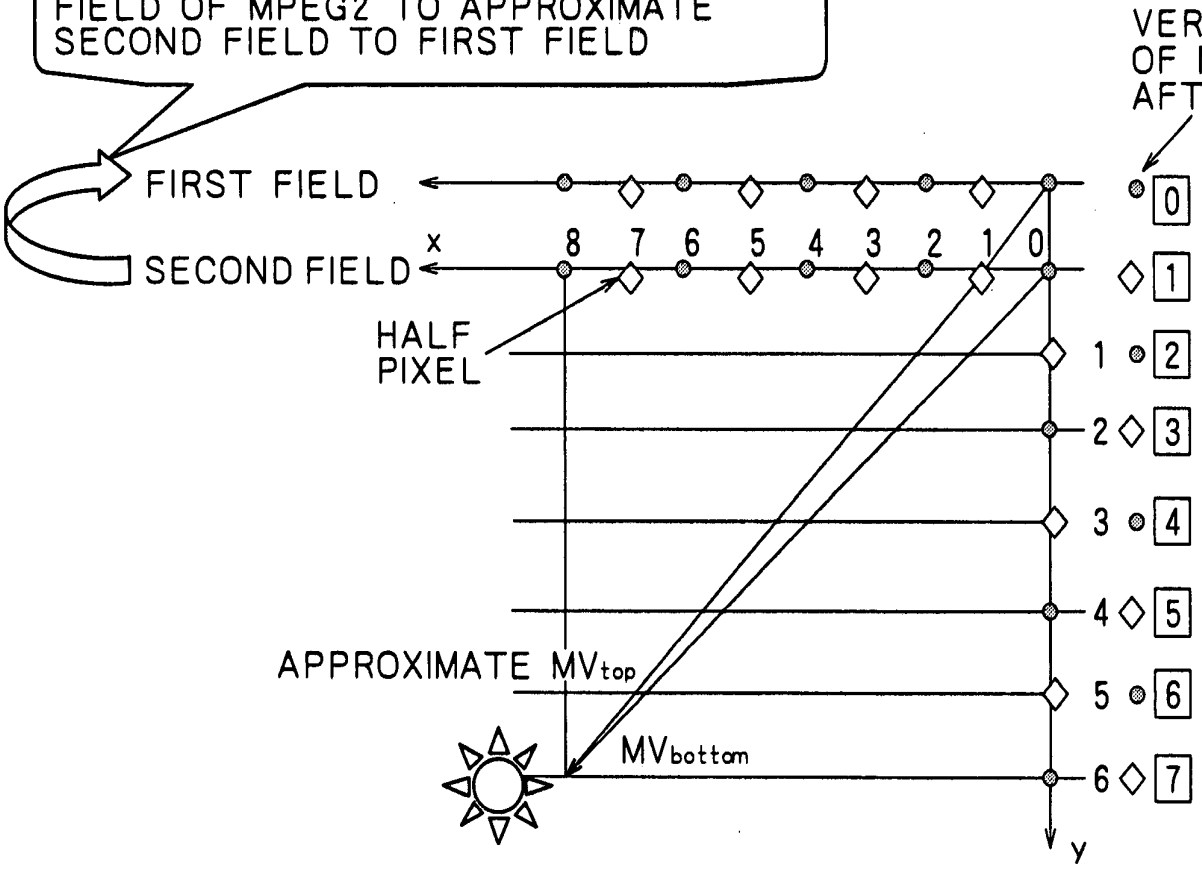


FIG. 11B



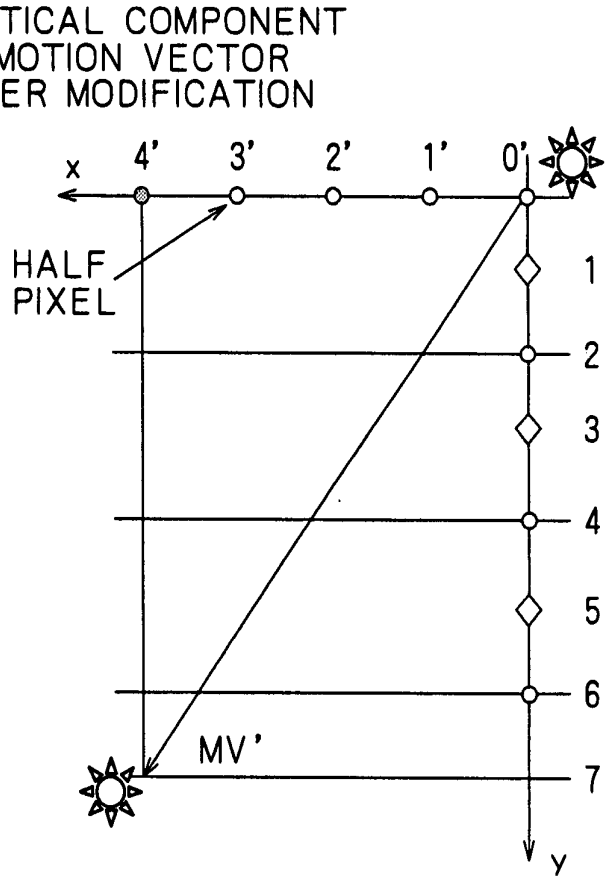
SINCE IMAGE ONLY OF EXTRACTED FIRST FIELD IS INPUTTED TO MPEG4 IMAGE CODING APPARATUS, FIRST FIELD IS USED AS REFERENCE IMAGE FOR MPEG4. THEREFORE, 1 IS ADDED TO VERTICAL COMPONENTS OF MOTION VECTORS UPON PREDICTION OF SECOND FIELD OF MPEG2 TO APPROXIMATE SECOND FIELD TO FIRST FIELD

FIG. 12A



BEFORE RESOLUTION CONVERSION

FIG. 12B



AFTER RESOLUTION CONVERSION

FIG. 13

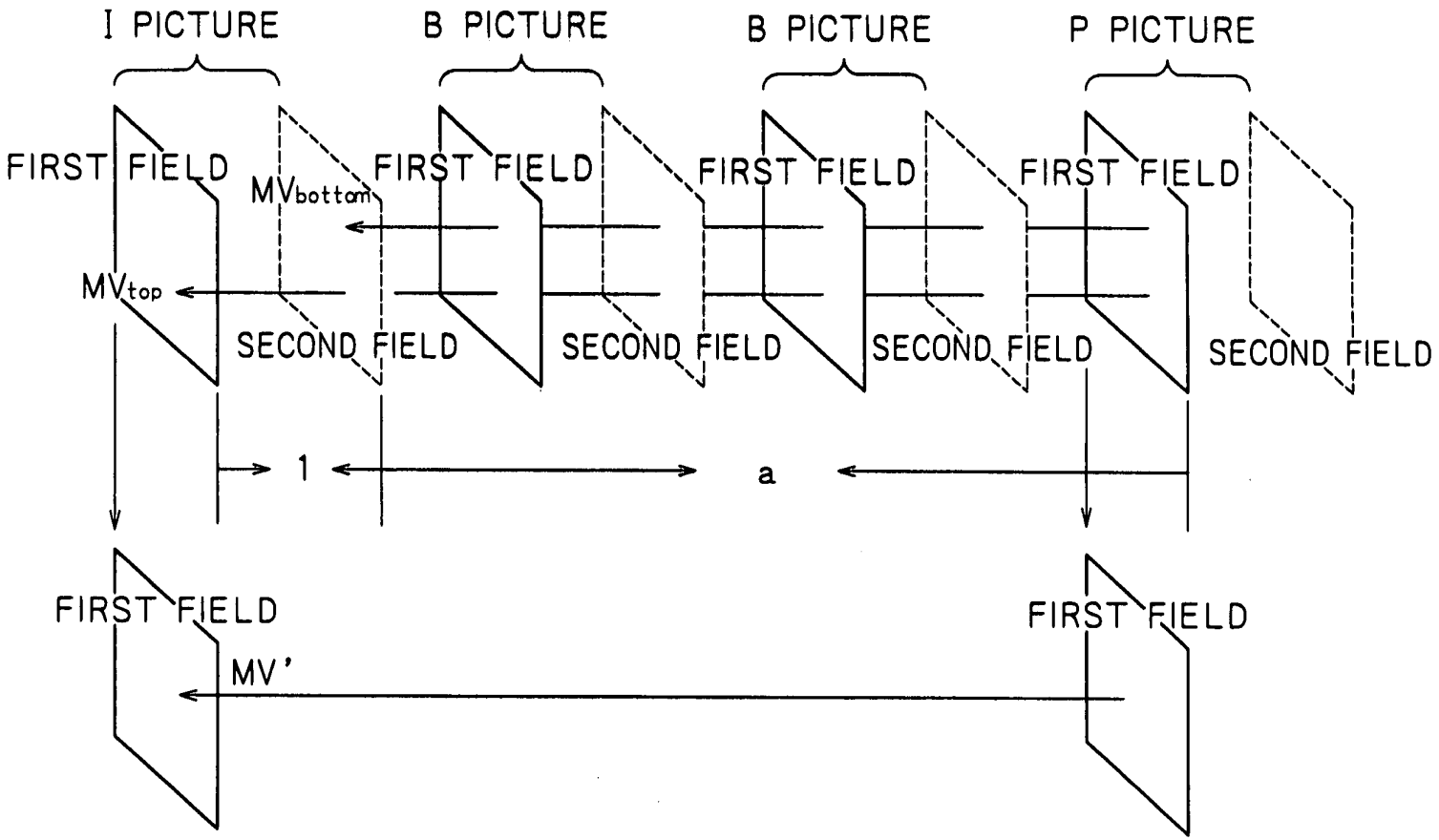

I PICTURE
B PICTURE
B PICTURE
P PICTURE
FIRST FIELD
FIRST FIELD
FIRST FIELD
FIRST FIELD
MVbottom
MVtop
SECOND FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
1
a
FIRST FIELD
FIRST FIELD
MV'

FIG. 14

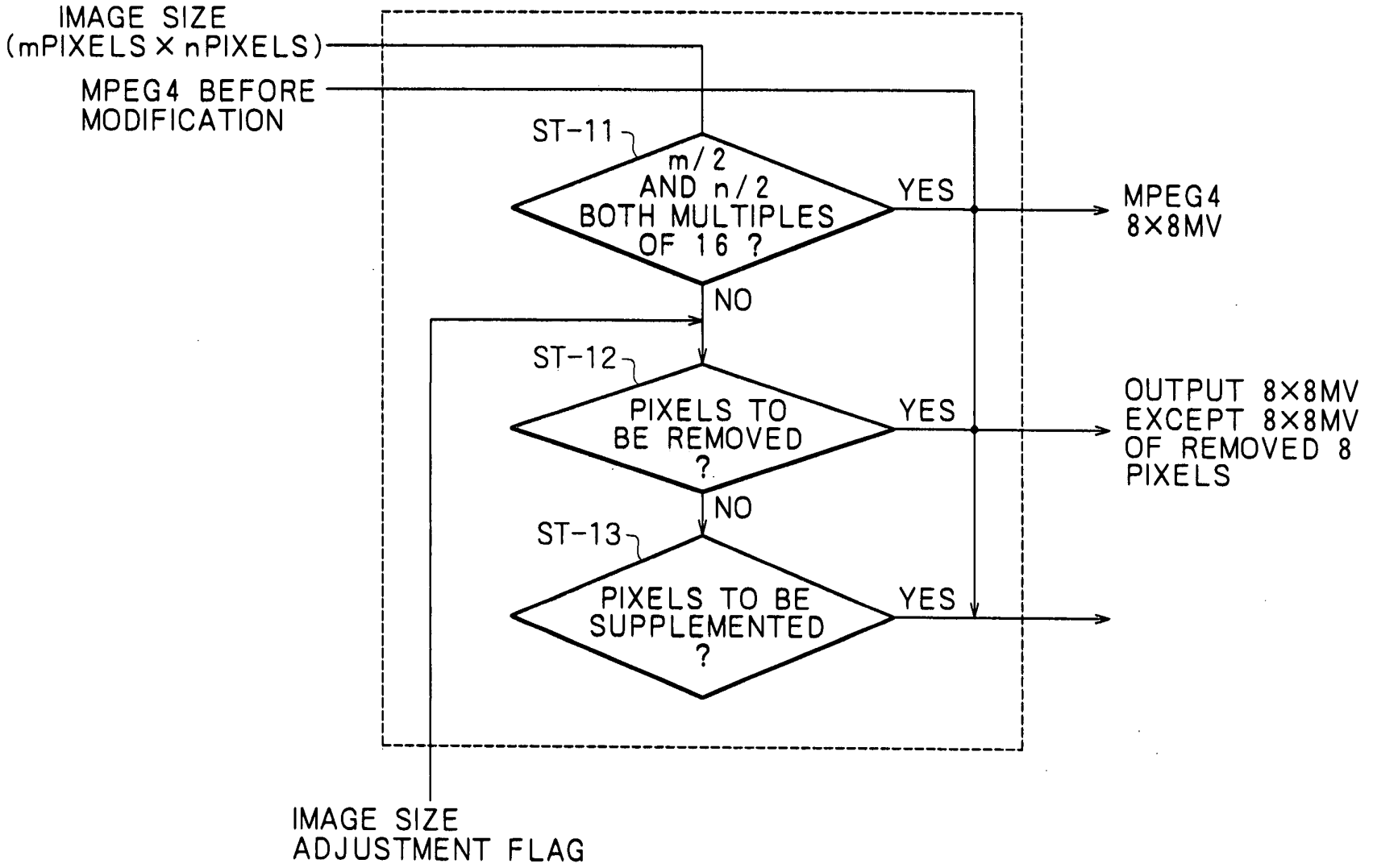


IMAGE SIZE
(mPIXELS × nPIXELS)
MPEG4 BEFORE MODIFICATION
ST-11
m/2 AND n/2 BOTH MULTIPLES OF 16 ?
YES
MPEG4 8×8MV
NO
ST-12
PIXELS TO BE REMOVED ?
YES
OUTPUT 8×8MV EXCEPT 8×8MV OF REMOVED 8 PIXELS
NO
ST-13
PIXELS TO BE SUPPLEMENTED ?
YES
IMAGE SIZE ADJUSTMENT FLAG

FIG. 15

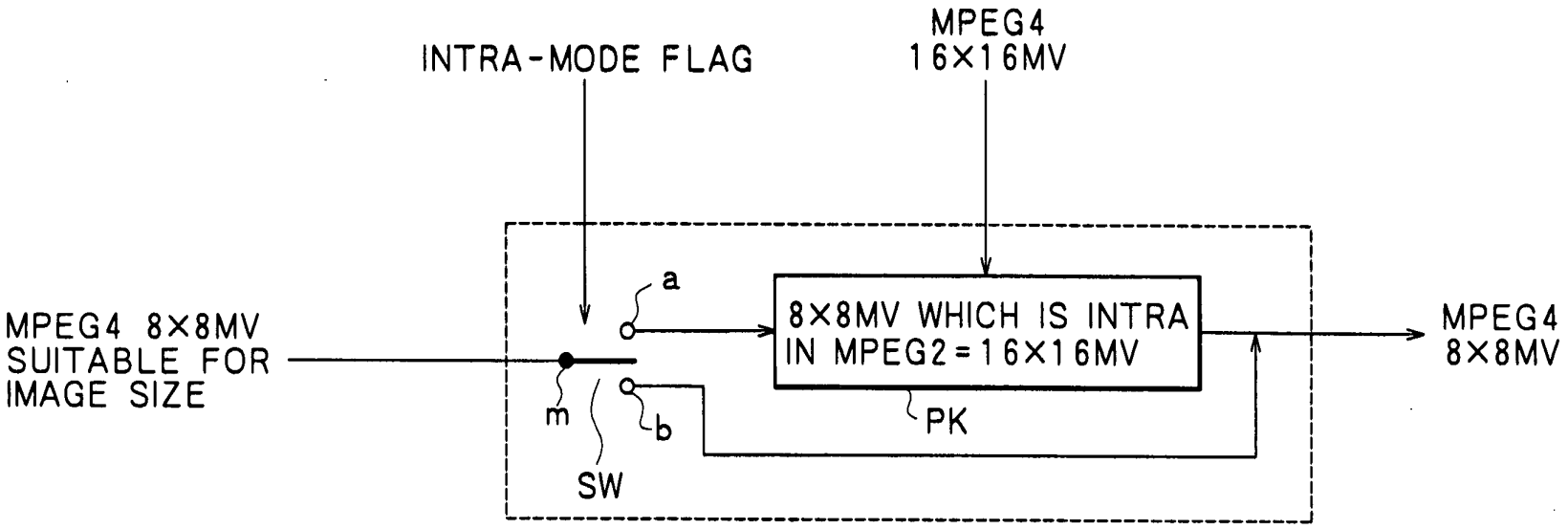

INTRA-MODE FLAG
MPEG4
16×16MV
MPEG4 8×8MV
SUITABLE FOR
IMAGE SIZE
a
m
b
SW
8×8MV WHICH IS INTRA
IN MPEG2=16×16MV
PK
MPEG4
8×8MV

FIG. 16

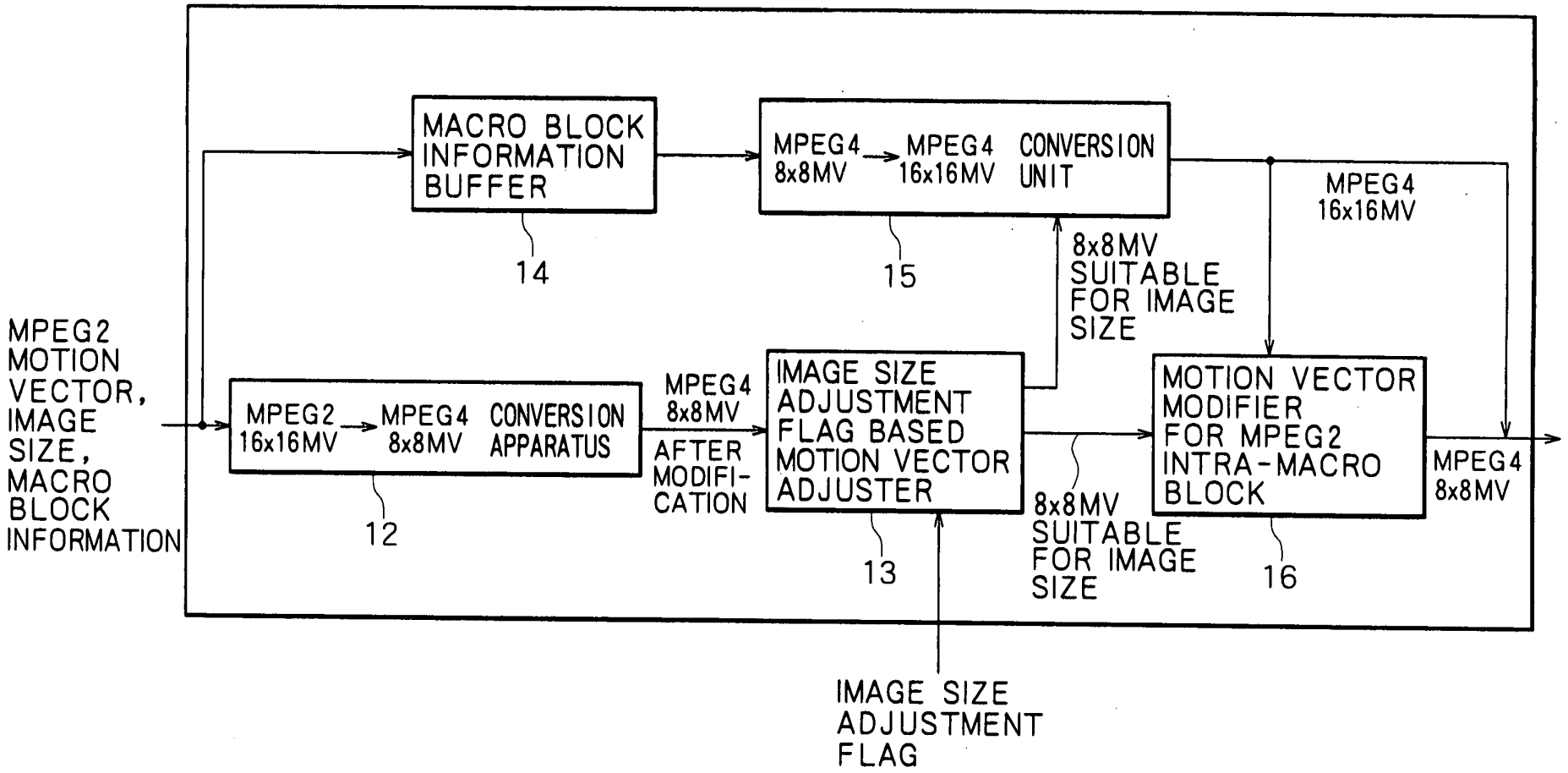


FIG. 17A

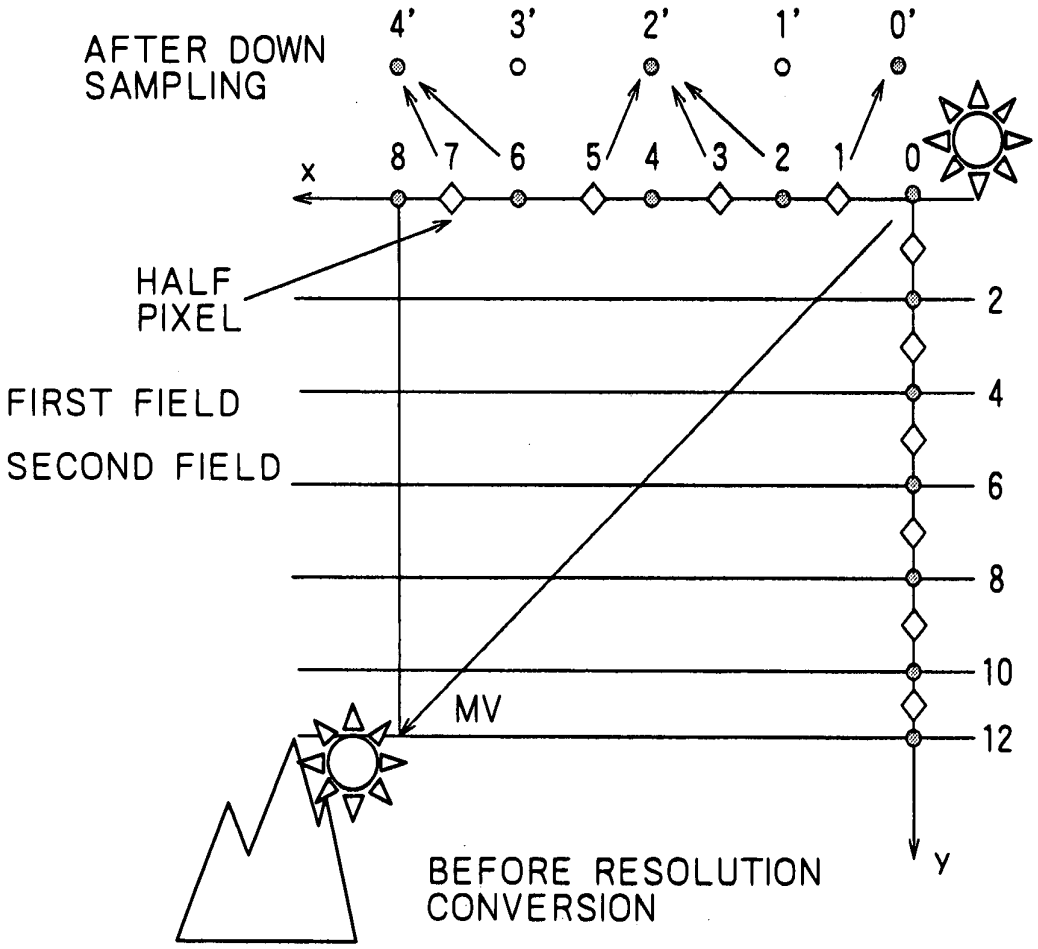


FIG. 17B

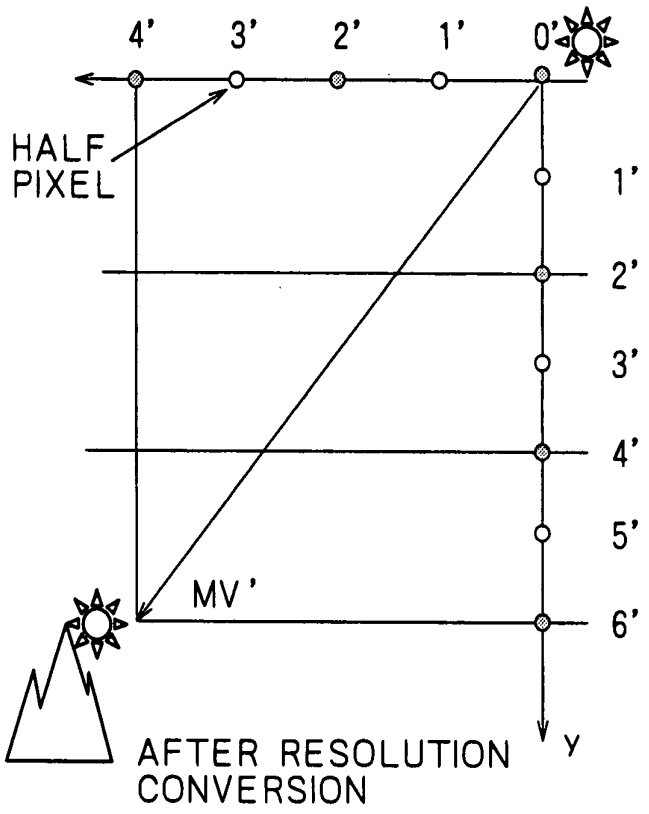


FIG. 18

REMAINDER WHEN MOTION VECTOR MV BEFORE CONVERSION IS DIVIDED BY 4	0	1	2	3
MOTION VECTLE AFTER CONVERSION	[MV/2]	[MV/2]	[MV/2]+1	[MV/2]

[MV/2] REPRESENTS INTEGER PART WHEN MV IS DIVIDED BY 2

FIG. 19A

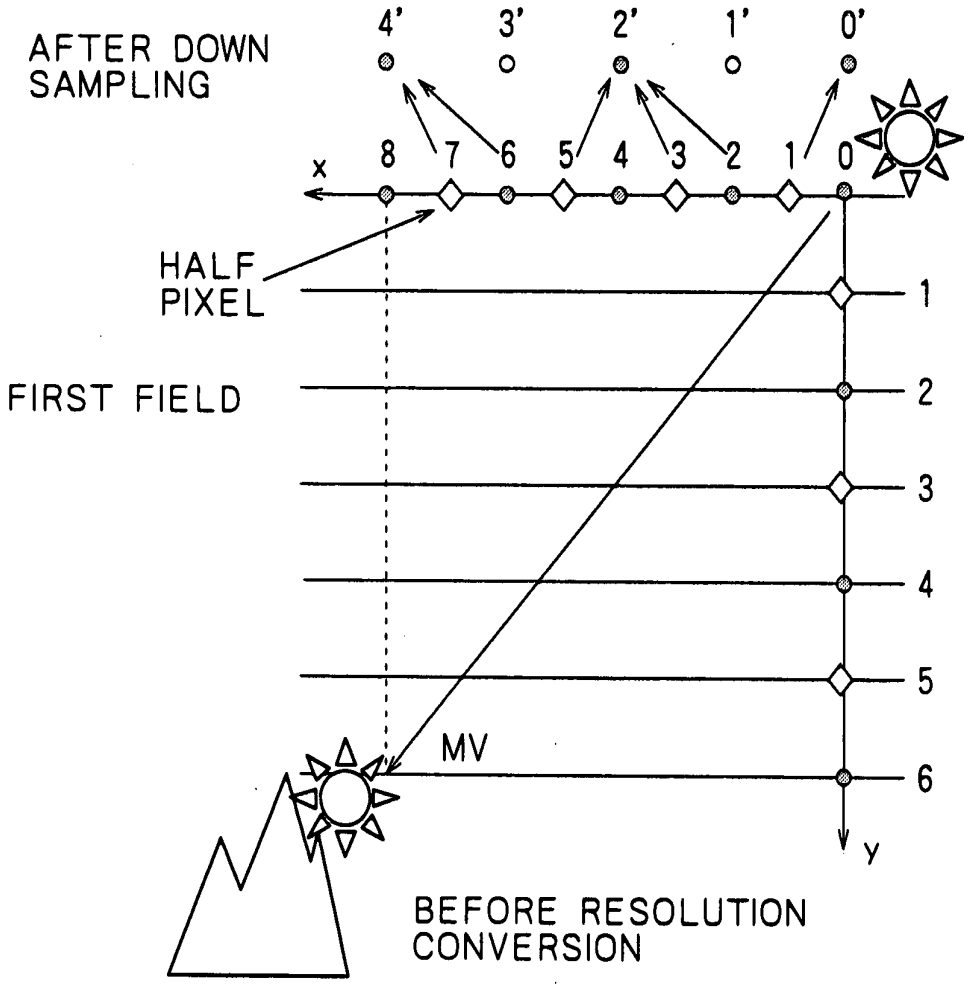
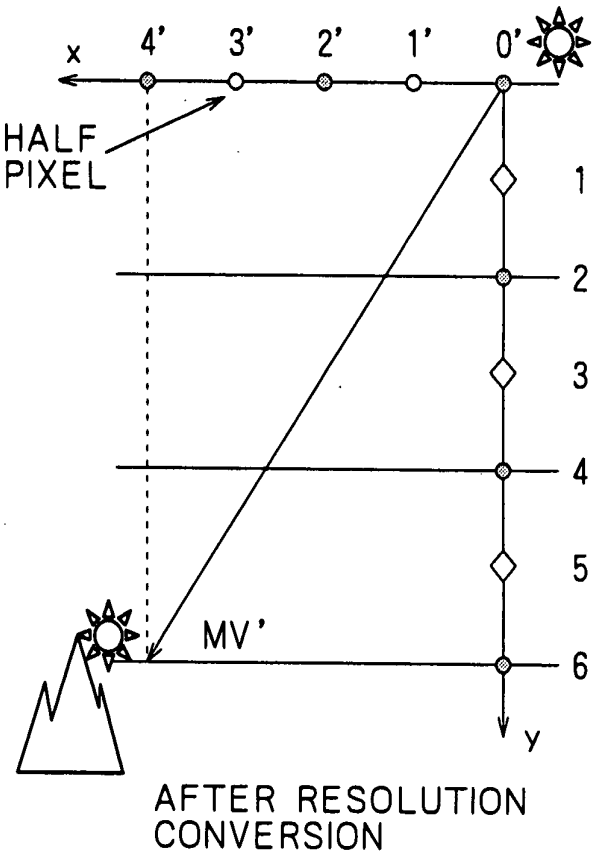
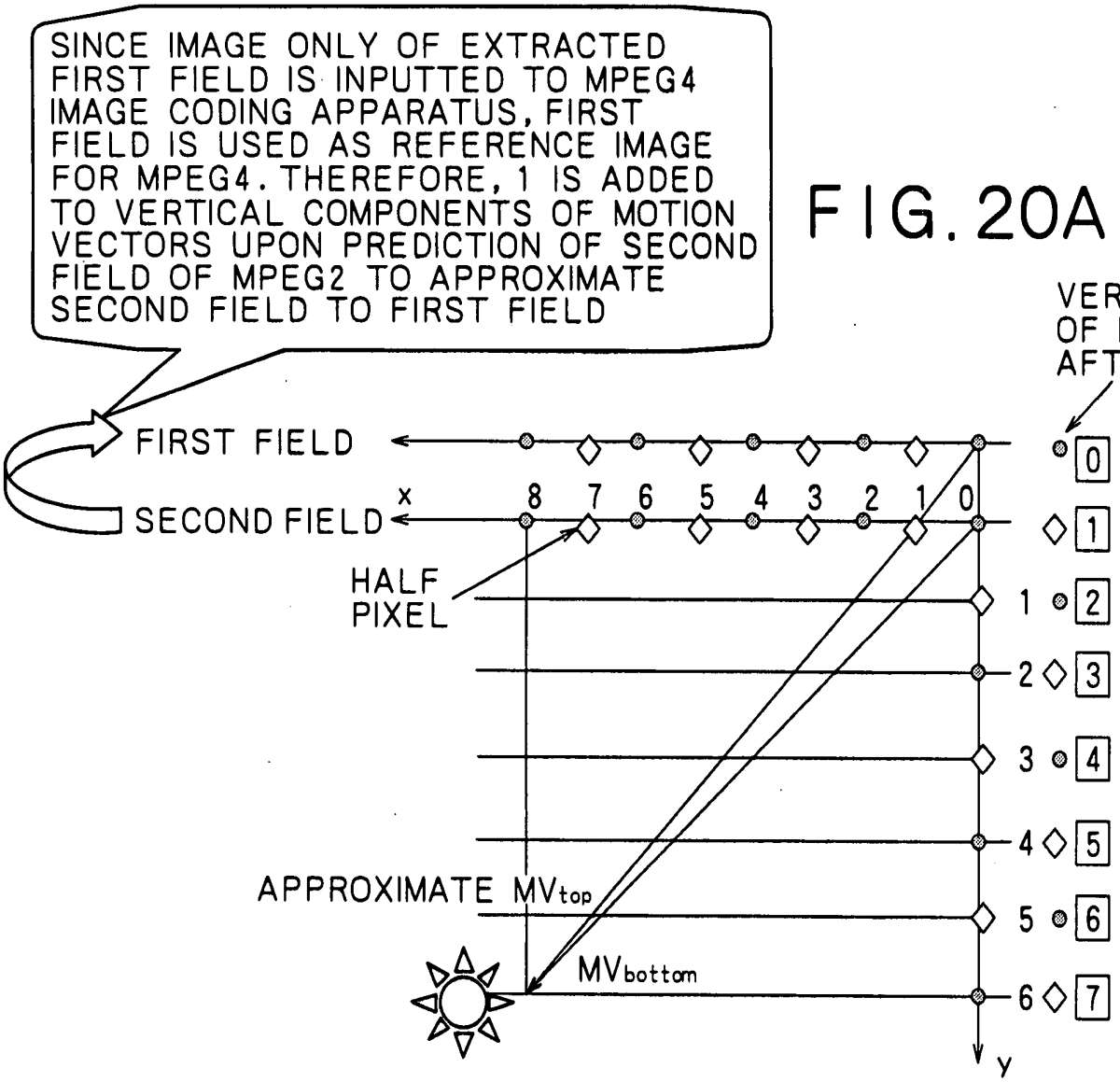


FIG. 19B



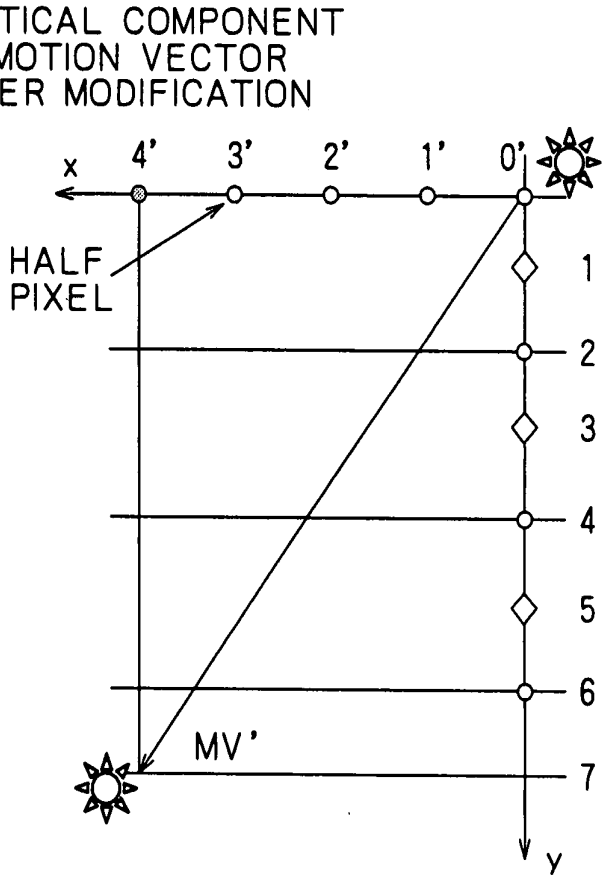
SINCE IMAGE ONLY OF EXTRACTED FIRST FIELD IS INPUTTED TO MPEG4 IMAGE CODING APPARATUS, FIRST FIELD IS USED AS REFERENCE IMAGE FOR MPEG4. THEREFORE, 1 IS ADDED TO VERTICAL COMPONENTS OF MOTION VECTORS UPON PREDICTION OF SECOND FIELD OF MPEG2 TO APPROXIMATE SECOND FIELD TO FIRST FIELD

FIG. 20A



BEFORE RESOLUTION CONVERSION

FIG. 20B



AFTER RESOLUTION CONVERSION

FIG. 21

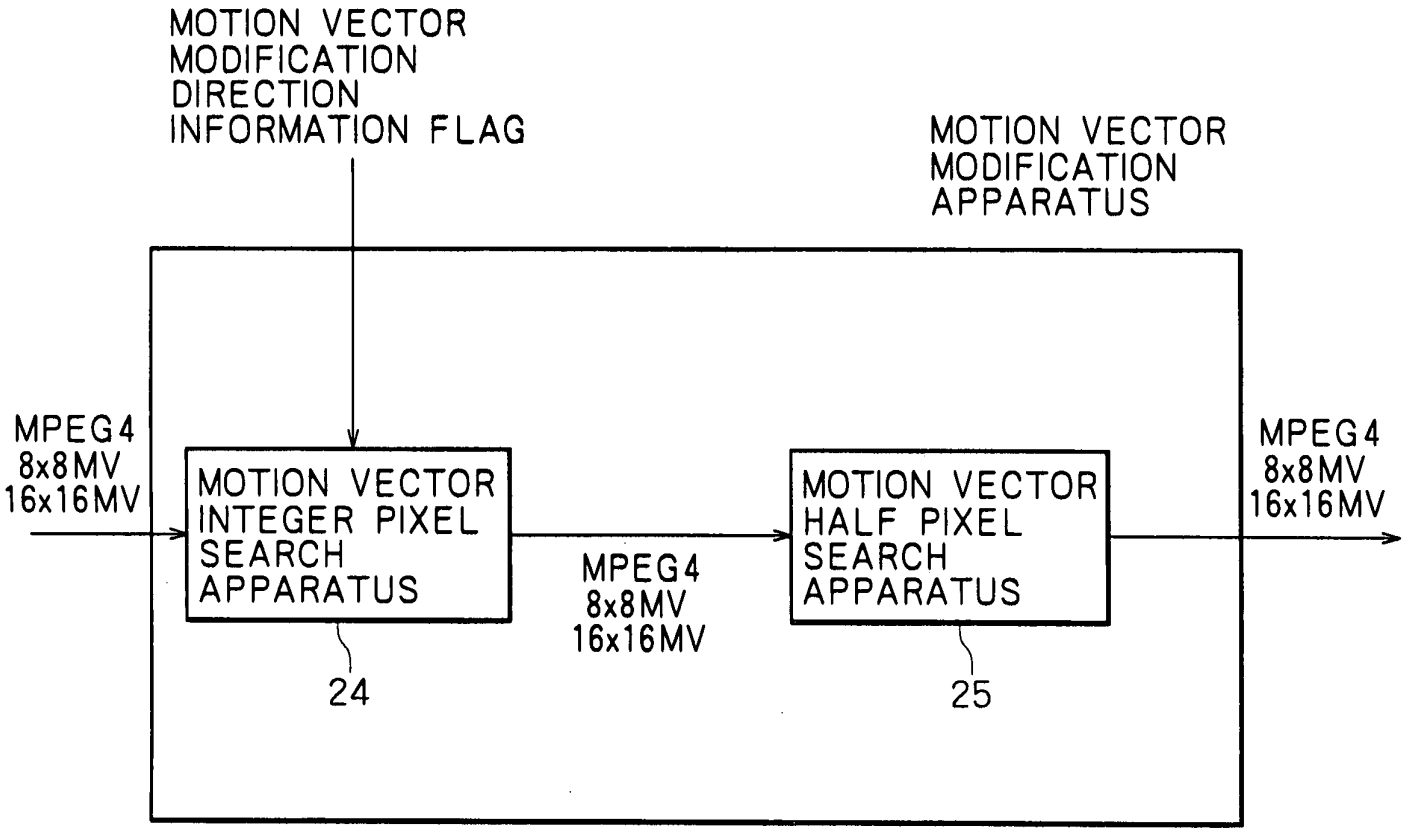
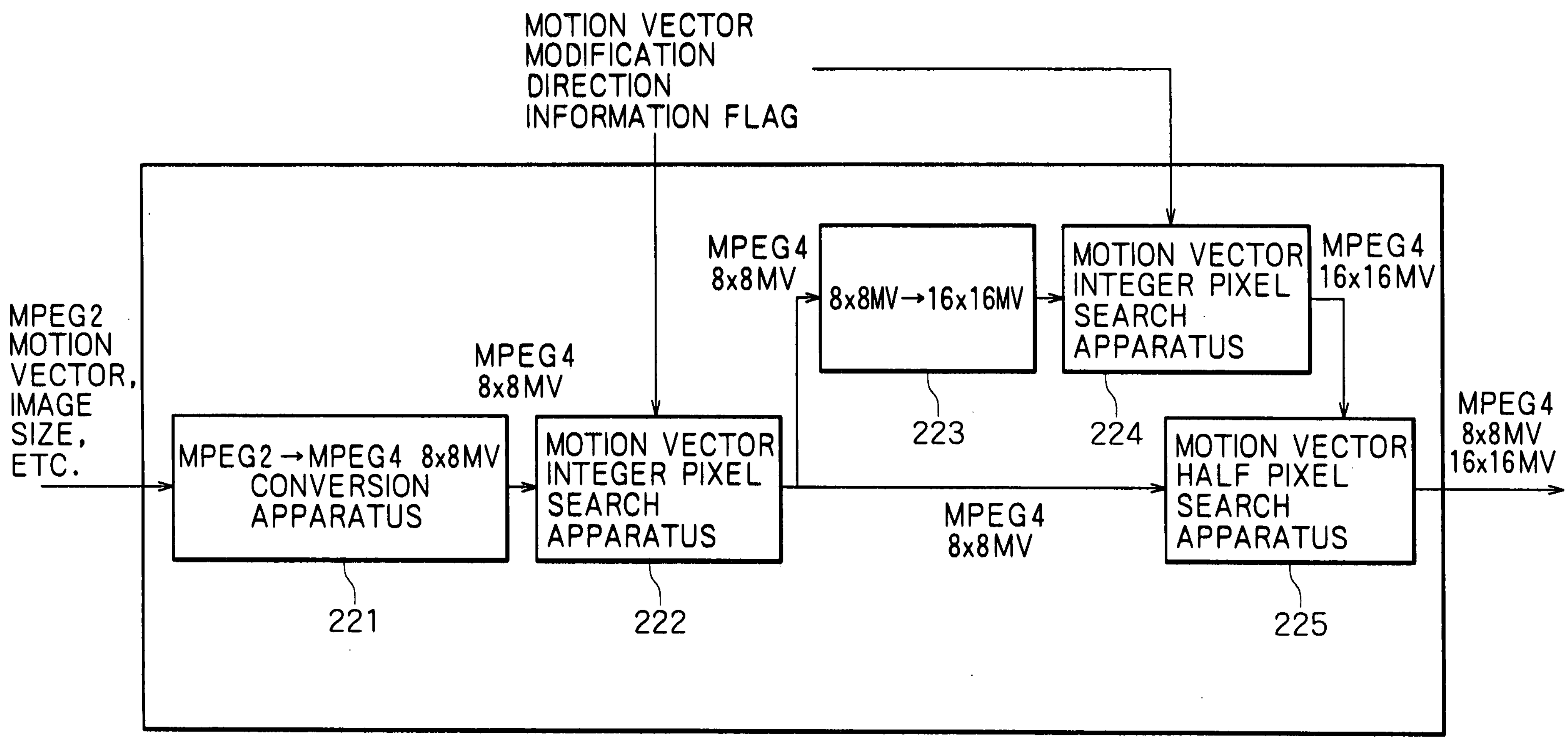

MOTION VECTOR MODIFICATION DIRECTION INFORMATION FLAG
MOTION VECTOR MODIFICATION APPARATUS
MPEG4 8x8MV 16x16MV
MOTION VECTOR INTEGER PIXEL SEARCH APPARATUS
MPEG4 8x8MV 16x16MV
MOTION VECTOR HALF PIXEL SEARCH APPARATUS
MPEG4 8x8MV 16x16MV
24
25

FIG. 22



MOTION VECTOR CONVERSION APPARATUS

○ MPEG2 INTEGER PIXEL ◍ MPEG4 INTEGER PIXEL

◇ MPEG2 HALF PIXEL

FIG. 23A

MODIFICATION FROM MPEG2 INTEGER PIXEL TO MPEG4

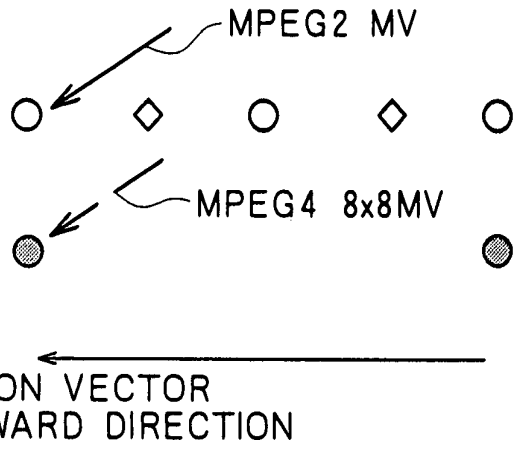
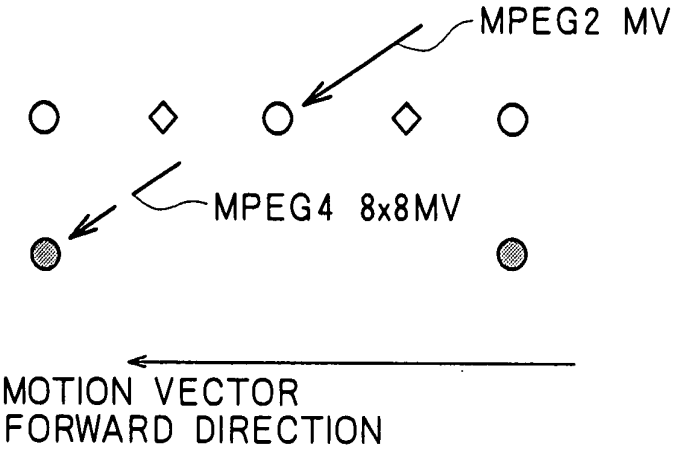


FIG. 23B

MODIFICATION FROM MPEG2 INTEGER PIXEL TO MPEG4 INTEGER PIXEL OF FORWARD DIRECTION



○ MPEG2 INTEGER PIXEL ◍ MPEG4 INTEGER PIXEL

◇ MPEG2 HALF PIXEL

FIG. 24A

MODIFICATION FROM MPEG2 INTEGER PIXEL TO MPEG4 INTEGER PIXEL VALUE OF FORWARD DIRECTION

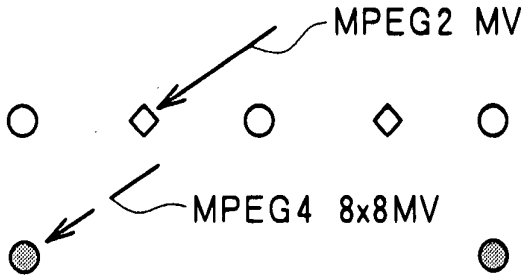


FIG. 24B

MODIFICATION FROM MPEG2 INTEGER PIXEL TO MPEG4 INTEGER PIXEL VALUE OF REVERSE DIRECTION

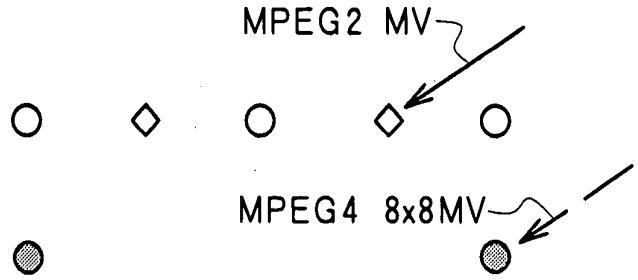


FIG. 25

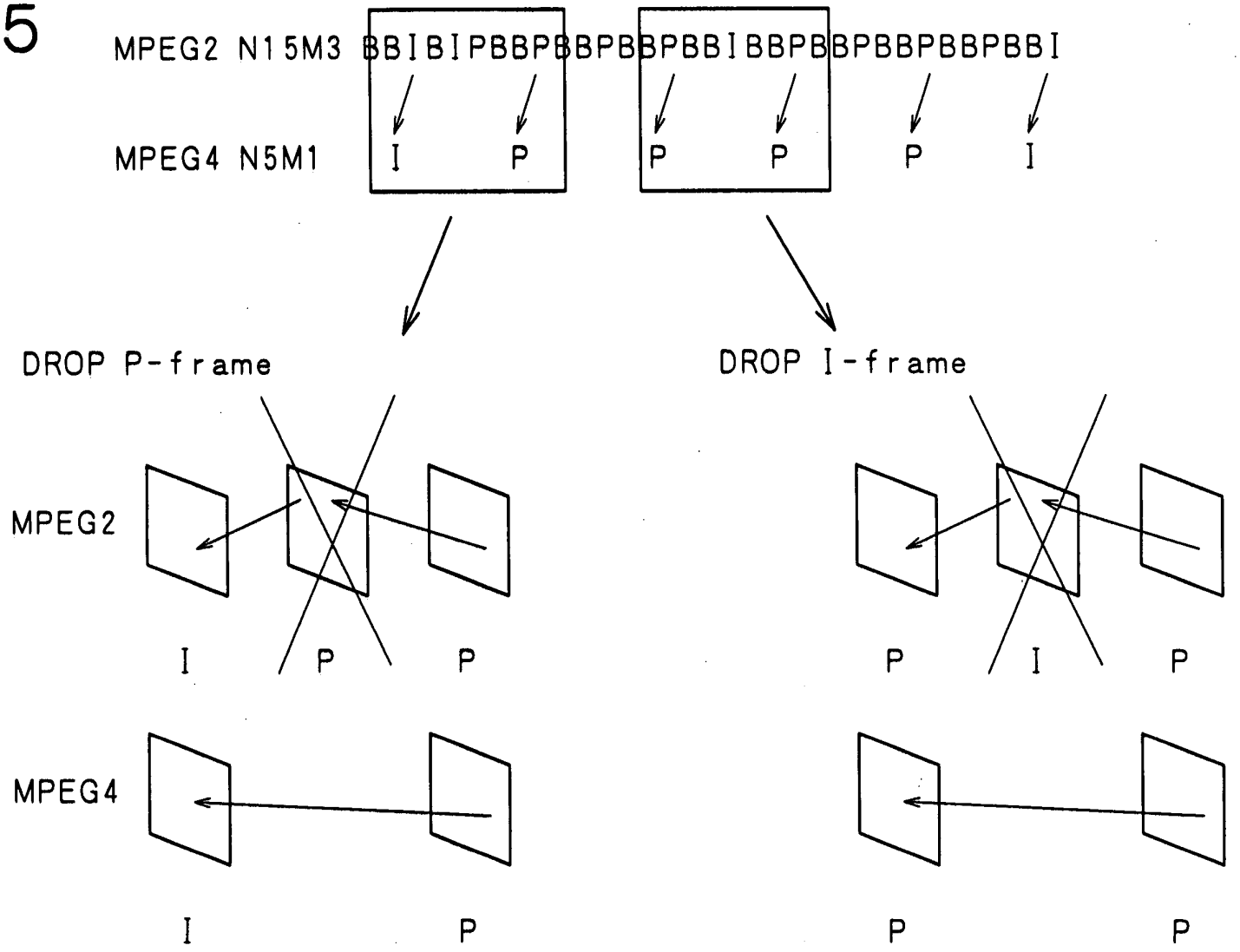
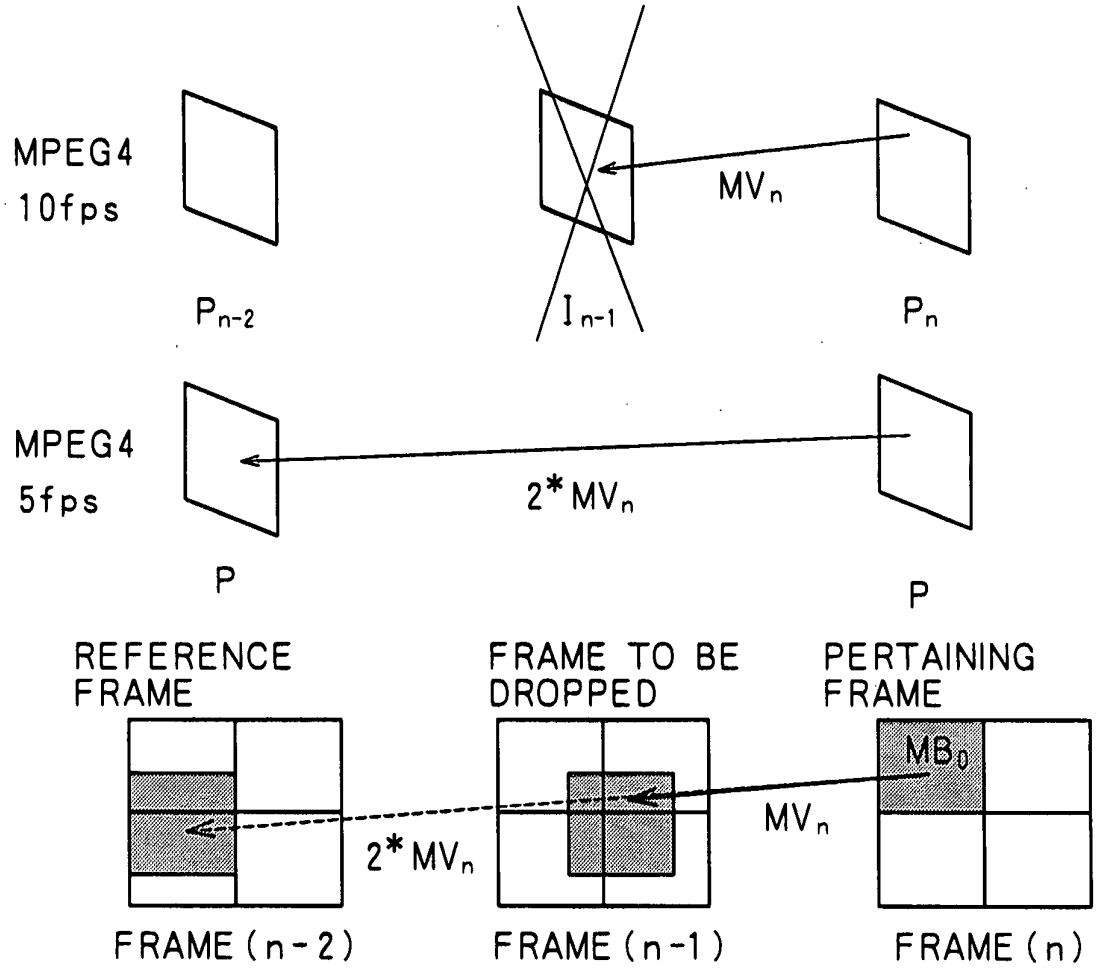

MPEG2 N15M3 BBIBIPBBPBBPBBPBBIBBPBBPBBPBBPBBI
MPEG4 N5M1
I
P
P
P
P
I
DROP P-frame
DROP I-frame
MPEG2
I
P
P
P
I
P
MPEG4
I
P
P
P

FIG. 26



EXTEND MOTION VECTOR TO TWICE LENGTH TO PERFORM TEMPORAL MODIFICATION

FIG. 27

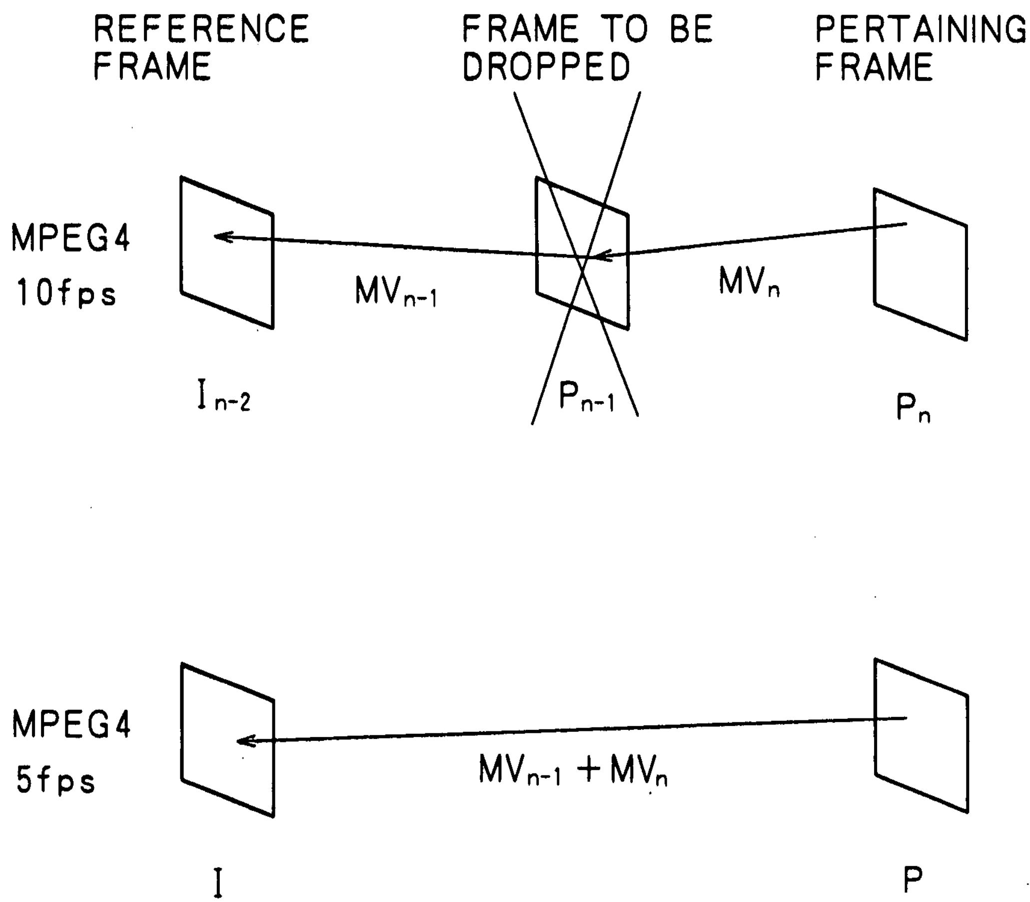
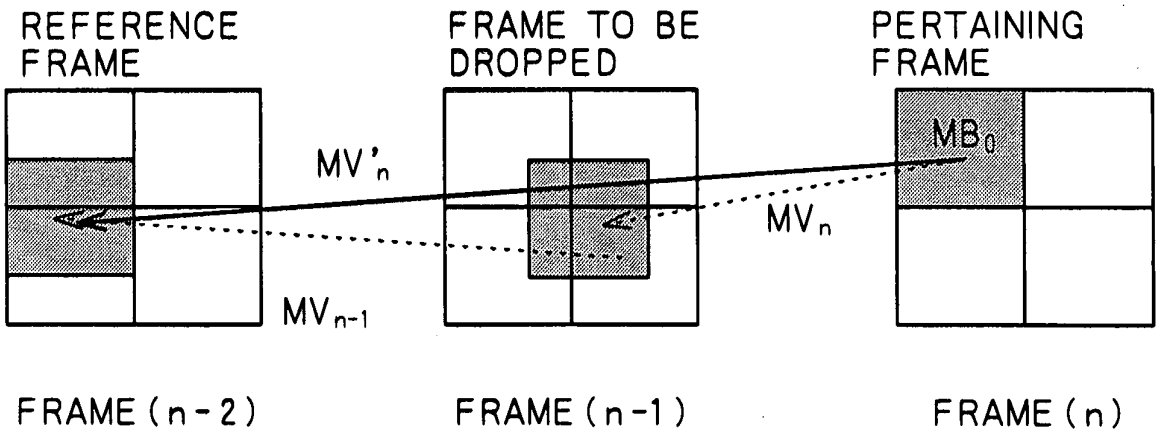


FIG. 28



SELECT MV_{n-1} WHICH EXHIBITS MAXIMUM PARAMETER X
(WHERE X IS ONE OF THE FOLLOWINGS)

- MB overlapped area
- MB overlapped area/Coefbits
- MB overlapped area/Q-scale
- MB overlapped area/(Coefbits×Q-scale)

$MV'_n = MV_n + MV_{n-1}$

FIG. 29

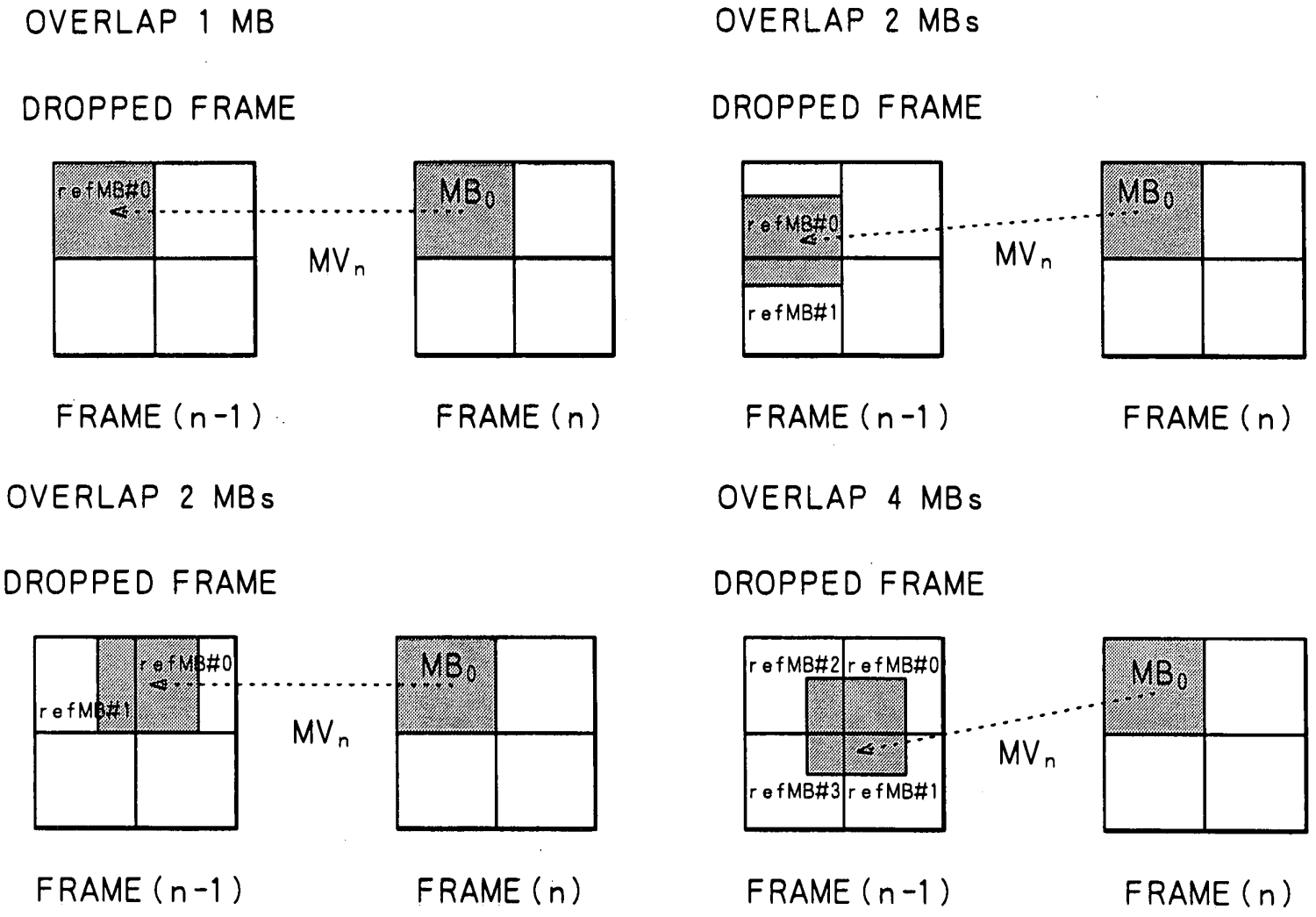

OVERLAP 1 MB
DROPPED FRAME
refMB#0
MB0
MVn
FRAME (n-1)
FRAME (n)
OVERLAP 2 MBs
DROPPED FRAME
refMB#0
refMB#1
MB0
MVn
FRAME (n-1)
FRAME (n)
OVERLAP 2 MBs
DROPPED FRAME
refMB#1
refMB#0
MB0
MVn
FRAME (n-1)
FRAME (n)
OVERLAP 4 MBs
DROPPED FRAME
refMB#2
refMB#0
refMB#3
refMB#1
MB0
MVn
FRAME (n-1)
FRAME (n)

FIG. 30

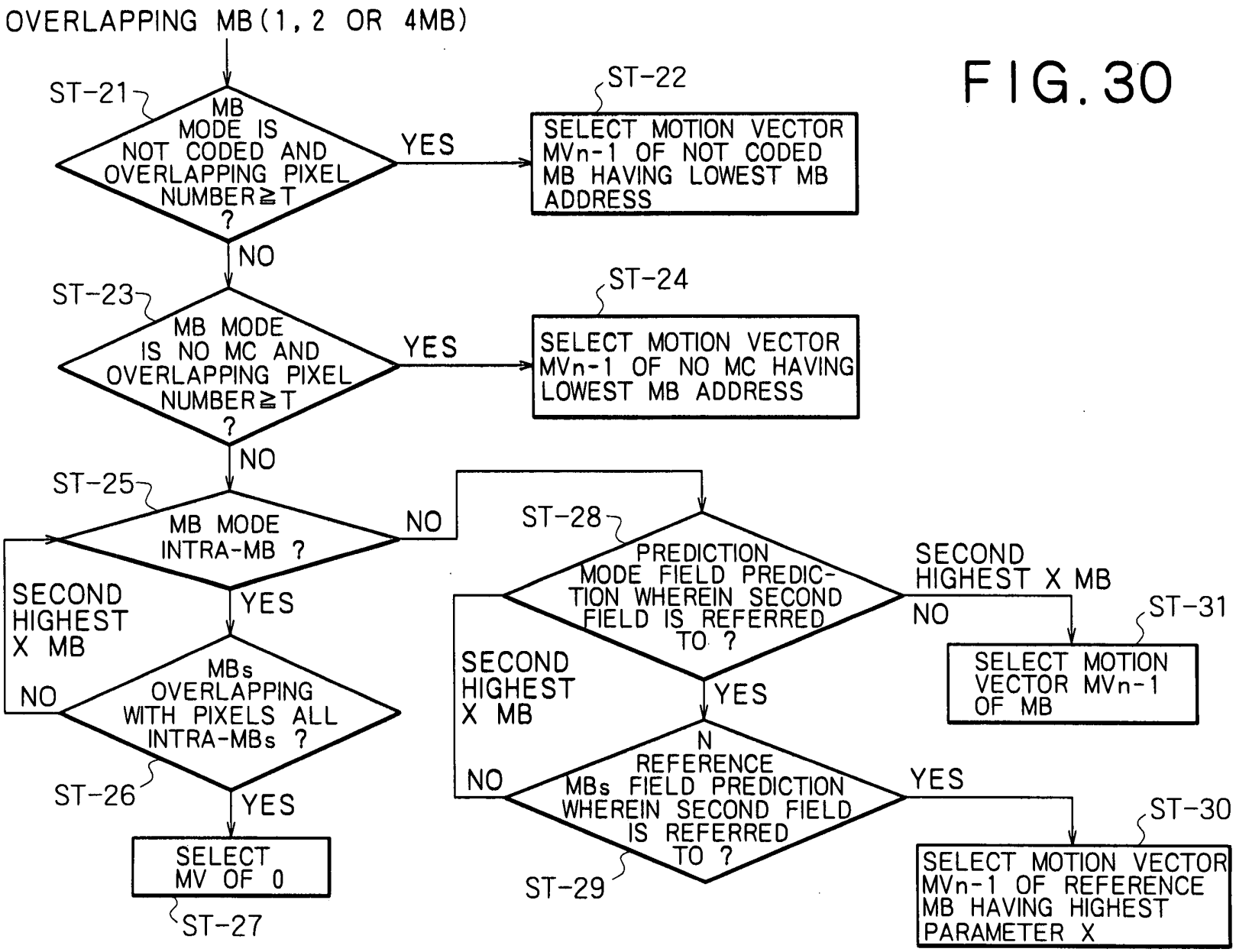

OVERLAPPING MB(1, 2 OR 4MB)
ST-21
MB MODE IS NOT CODED AND OVERLAPPING PIXEL NUMBER≧T ?
YES
ST-22
SELECT MOTION VECTOR MVn-1 OF NOT CODED MB HAVING LOWEST MB ADDRESS
NO
ST-23
MB MODE IS NO MC AND OVERLAPPING PIXEL NUMBER≧T ?
YES
ST-24
SELECT MOTION VECTOR MVn-1 OF NO MC HAVING LOWEST MB ADDRESS
NO
ST-25
MB MODE INTRA-MB ?
NO
YES
SECOND HIGHEST X MB
MBs OVERLAPPING WITH PIXELS ALL INTRA-MBs ?
NO
YES
ST-26
SELECT MV OF 0
ST-27
ST-28
PREDICTION MODE FIELD PREDICTION WHEREIN SECOND FIELD IS REFERRED TO ?
SECOND HIGHEST X MB
NO
ST-31
SELECT MOTION VECTOR MVn-1 OF MB
YES
SECOND HIGHEST X MB
N REFERENCE MBs FIELD PREDICTION WHEREIN SECOND FIELD IS REFERRED TO ?
NO
YES
ST-29
ST-30
SELECT MOTION VECTOR MVn-1 OF REFERENCE MB HAVING HIGHEST PARAMETER X

FIG. 31

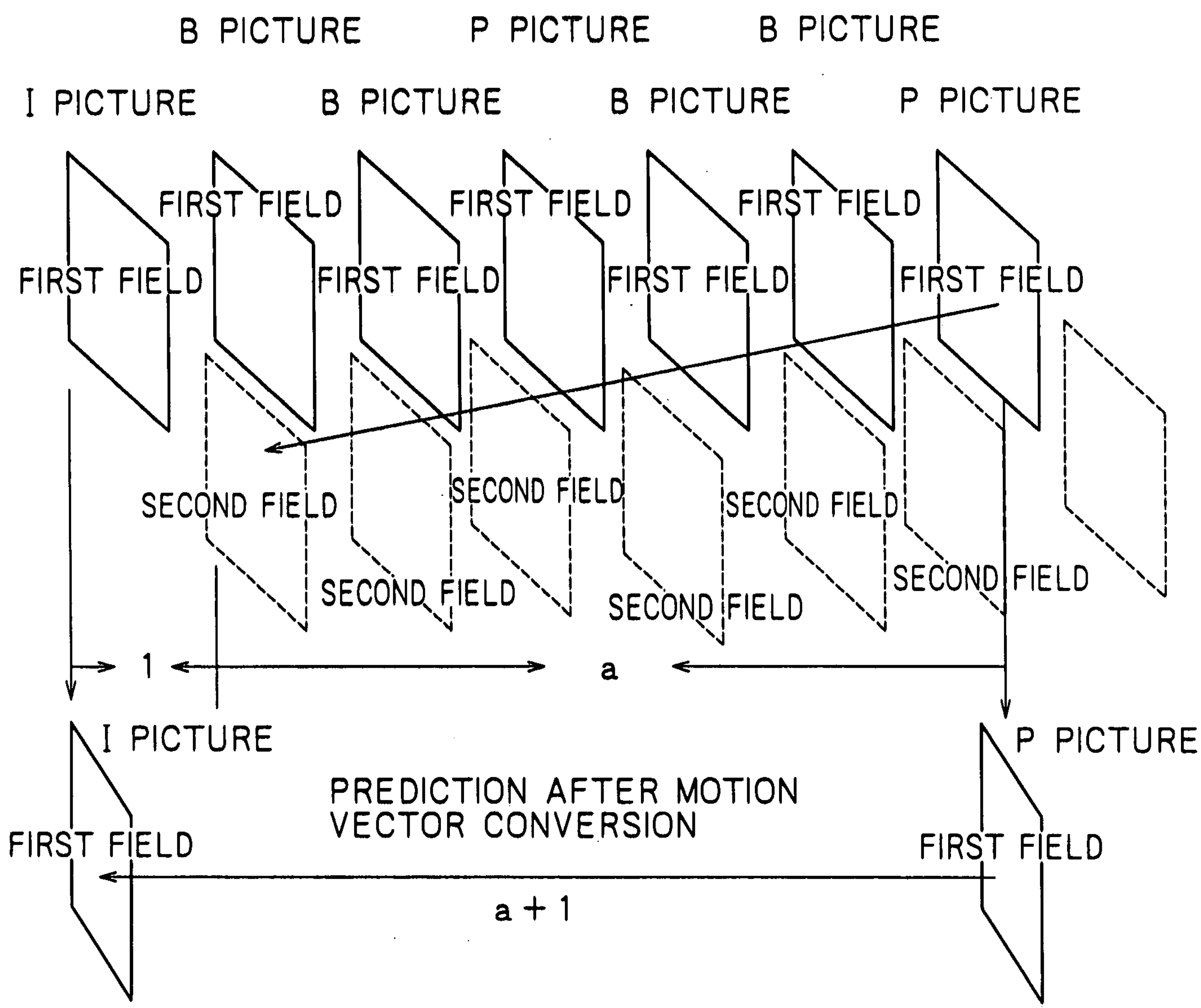

I PICTURE
B PICTURE
B PICTURE
P PICTURE
B PICTURE
B PICTURE
B PICTURE
P PICTURE
FIRST FIELD
FIRST FIELD
FIRST FIELD
FIRST FIELD
FIRST FIELD
FIRST FIELD
FIRST FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
SECOND FIELD
1
a
I PICTURE
P PICTURE
PREDICTION AFTER MOTION
VECTOR CONVERSION
FIRST FIELD
FIRST FIELD
a + 1

FIG. 32

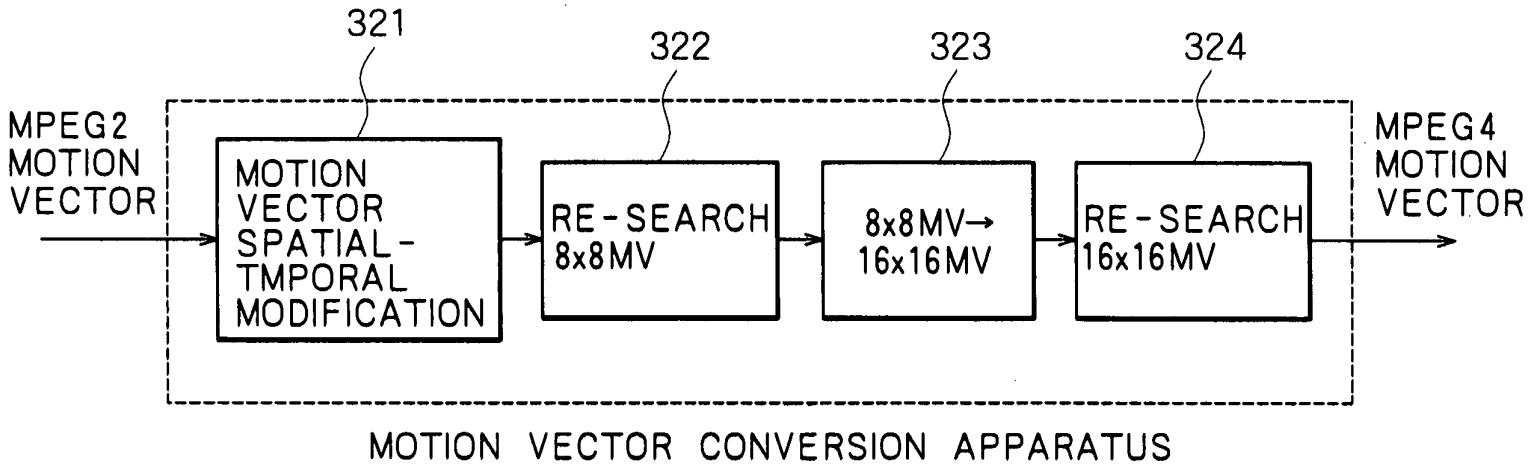
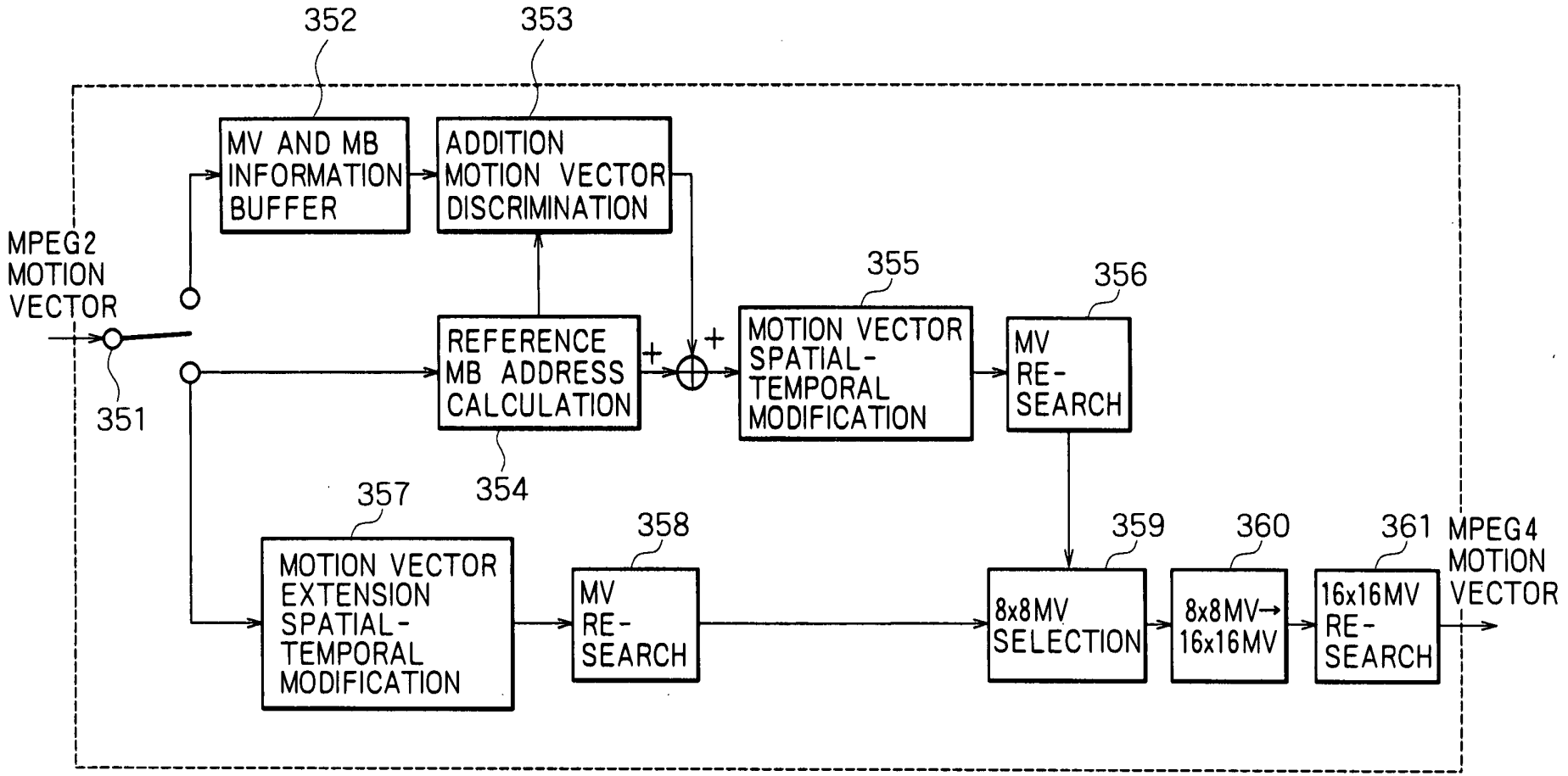
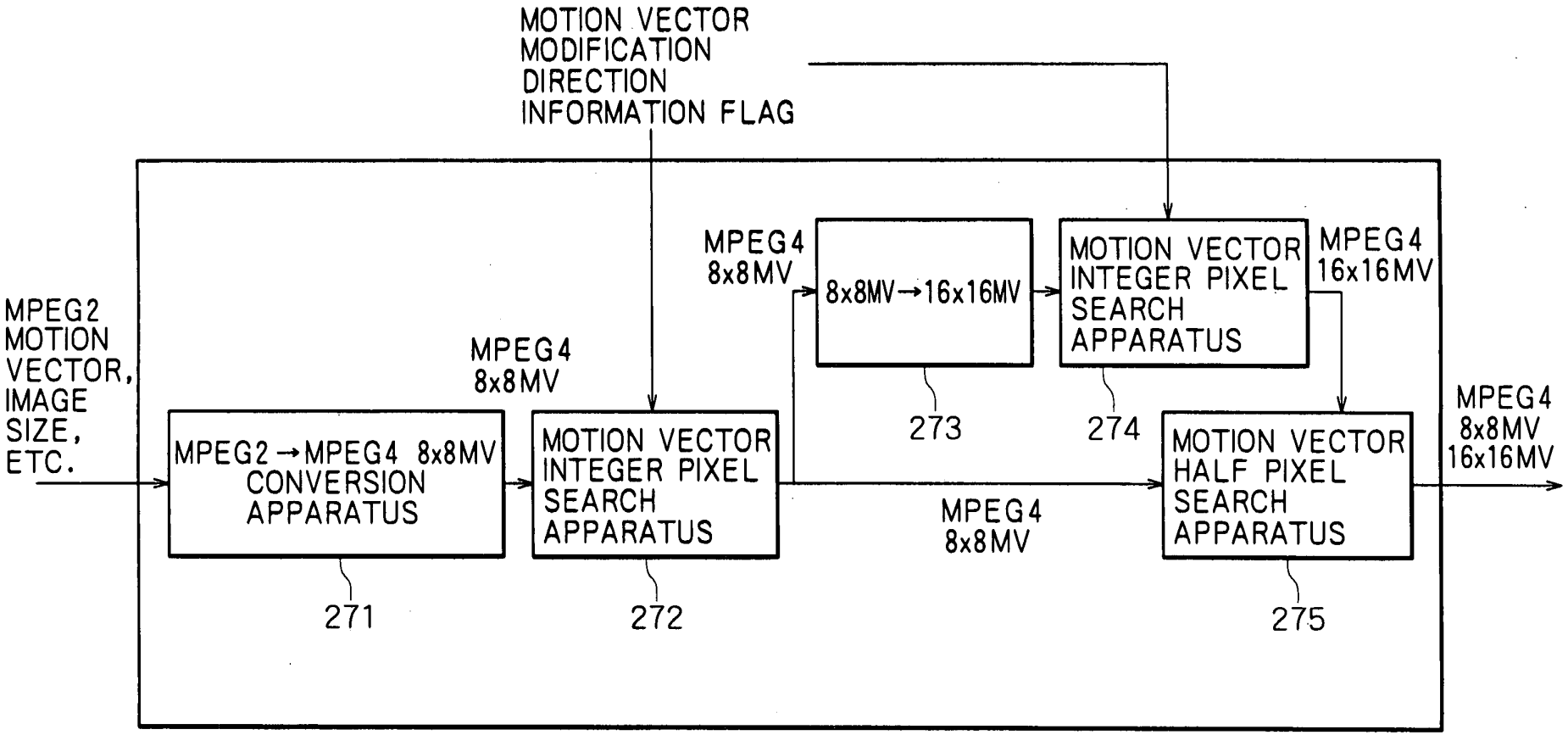

321
322
323
324
MPEG2
MOTION
VECTOR
MOTION
VECTOR
SPATIAL-
TMPORAL
MODIFICATION
RE-SEARCH
8x8MV
8x8MV→
16x16MV
RE-SEARCH
16x16MV
MPEG4
MOTION
VECTOR
MOTION VECTOR CONVERSION APPARATUS

FIG. 33



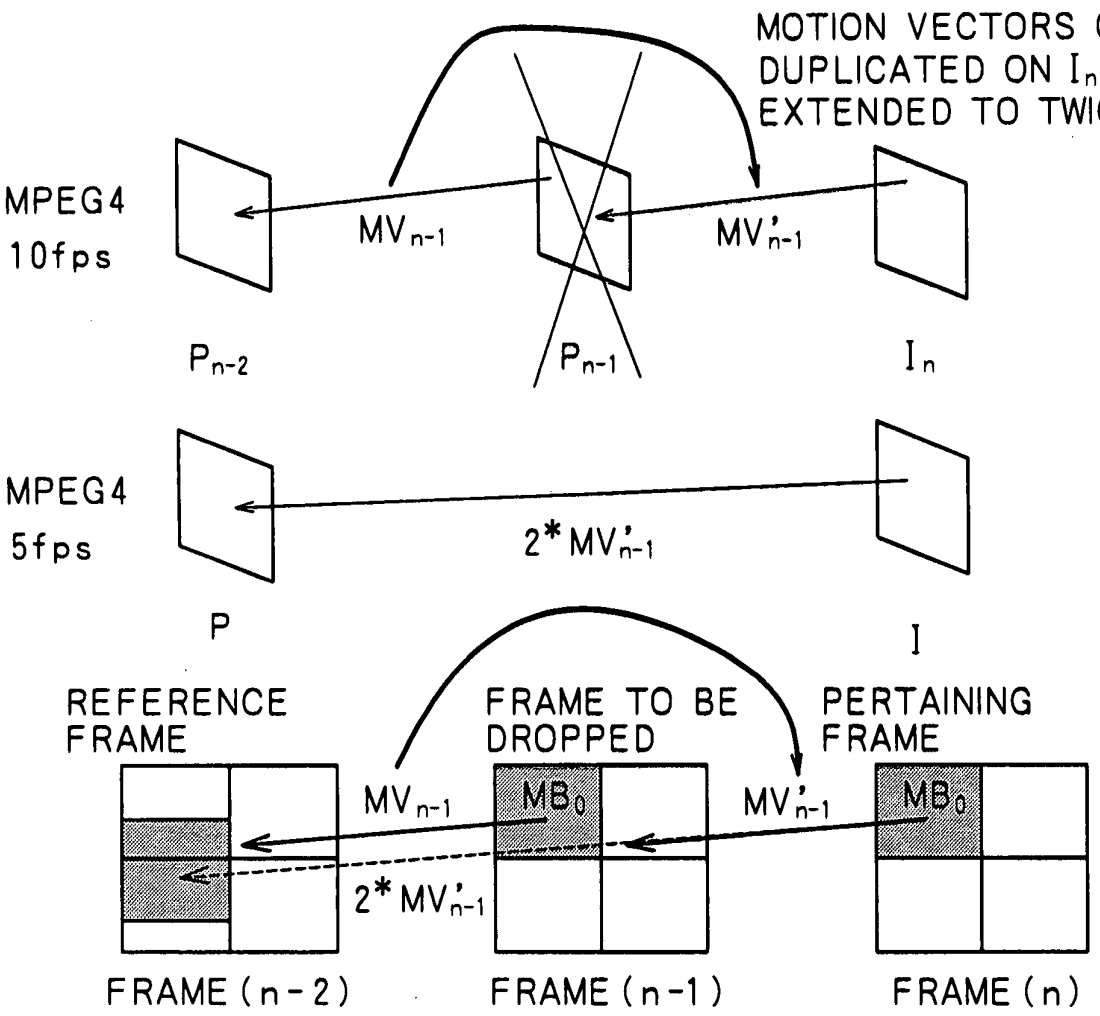
MOTION VECTOR CONVERSION APPARATUS

FIG. 34



MOTION VECTOR CONVERSION APPARATUS

FIG. 35



MV_{n-1} IS DUPLICATED AND EXTENDED TO TWICE FOR TEMPORAL MODIFICATION

FIG. 36

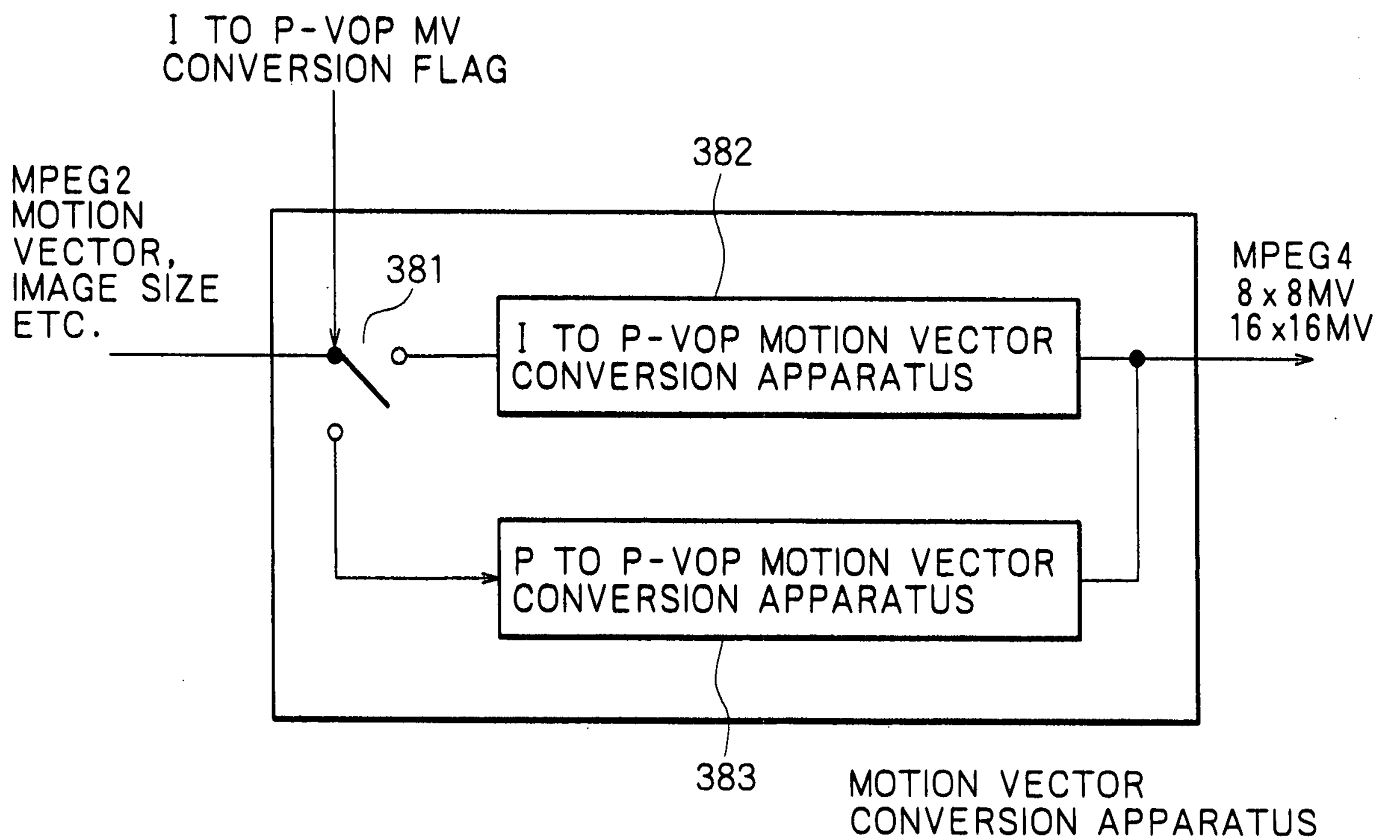
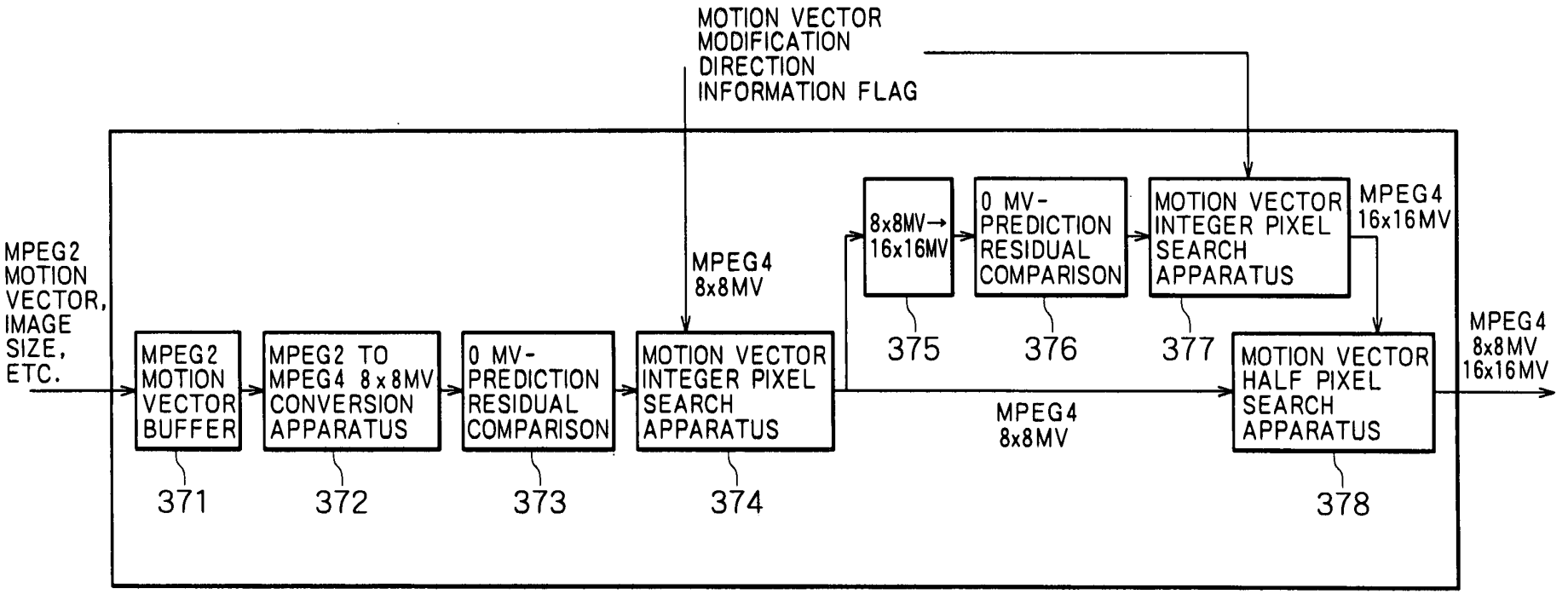

I TO P-VOP MV
CONVERSION FLAG
MPEG2
MOTION
VECTOR,
IMAGE SIZE
ETC.
381
382
I TO P-VOP MOTION VECTOR
CONVERSION APPARATUS
P TO P-VOP MOTION VECTOR
CONVERSION APPARATUS
383
MPEG4
8 x 8MV
16 x16MV
MOTION VECTOR
CONVERSION APPARATUS

FIG. 37



I TO P MOTION VECTOR CONVERSION APPARATUS